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The Fulham Extension.

AS stated in our last issue, the Electricity Commissioners have now given their consent on terms to the extension of the Fulham power station by 132,000 kW. The terms indicated are those which might have been expected from the evidence submitted at the official inquiry, reported in our issues of December 26th and January 2nd. They include provisions that the Borough Council shall use the most efficient methods available at any time for the elimination of smoke and grit, the prevention of sulphur emissions, and the avoidance of noise and vibration; they also require the height of the chimneys to be not less than 300 ft.

The Commissioners have not formally prescribed the precise degree of efficiency to be attained by the sulphur-elimination plant, as they feel that the public interests will be adequately safeguarded under the terms imposed. While these terms seem to us reasonable, having regard to the peculiar conditions appertaining to the erection of large base-load stations in the west-end of London, we trust they will not be regarded as forming a precedent when consent is given for the extension of existing or the construction of new power stations elsewhere.

In the case of Fulham, it has been necessary to pay due regard to a number of varied interests, and London, as we have always maintained, is like no other town in this matter. The cost of complying with the conditions imposed will be small when compared with those that would have been incurred without the new plant. Nevertheless, the additional cost is appreciable in the absolute sense, and if imposed in other instances is bound to react unfavourably on the general cost of electricity. Due credit must be allowed to public supply undertakings for the beneficial effects that must follow the supersession of individual chimneys, whether industrial or domestic, by the spread of electrification.

As a considerable public interest has been aroused in the contemplated extensions at Fulham, particularly with regard to the nuisance question, the Electricity Commissioners have done wisely in publishing the report of their colleagues who conducted the inquiry. As the three reporting Commissioners point out at the outset, the opposition of the L.C.C. and the three Borough Councils has fortunately enabled every aspect to be brought to light; the public

thus knows the worst that can be said against the Fulham station, and also probably against any other stations which it may be necessary to construct in urban areas. Discussing the urgency for the extension, they seem to hold the view that the growth of load in the west-end is likely to exceed the estimate made by the Central Electricity Board, which has always seemed to us to err on the side of understatement. The Commissioners also answer what seemed to us to be really the most important technical objection raised at the inquiry to which we do not recollect any very definite reply being given. Regarded from the standpoint of hitherto prevailing practice, the capacity for coal storage is small; it allows for only 16 days' supply when the ultimate installation of 318,000 kW has been reached. It is pointed out, however, that the problem of coal reserves must be considered in relation to all the London stations, and that the necessary emergency stocks can be most economically placed by the C.E.B. where land is less expensive. The only difficulty in local delivery would be that caused by fogs, and to guard against this a margin of 16 days' supply should be more than ample.

The alternative of down-river power stations is discussed at some length. It is made clear that earlier recommendations of engineers reporting on London's electricity supply, which embodied suggestions of this nature, did not take into account recent developments in the western part of the area, which, indeed, could not have been foreseen.

An interesting investigation (though not one, we think, that the Commissioners were under any obligation to make, as the national scheme rests upon the principle) is that regarding the effect of producing the equivalent of the output from the first section of the Fulham station from smaller stations; the cost of energy, it is estimated, would be from two-thirds to twice as much as with the large station contemplated.

In publishing a reasoned justification for their decision, the Commissioners have perhaps gone further than is usually required of public officials, but their action may be regarded as evidence of the sincerity of the claim made by the Minister of Transport at the dinner of the I.E.E. (N.W. Centre), that his Department does wish to be regarded as an integral part of the industry which it serves.

The Contractors' Dinner.

THE speeches delivered at the annual dinners of the Electrical Contractors' Association are invariably of a high order, containing much interesting matter and advancing timely and constructive suggestions. Such traditions were maintained at last week's function, of which a report appears elsewhere in this issue. MR. H. MORRISON, who in his capacity of Minister of Transport has become the apostle of the electrical industry, was in good form as he continued to urge upon all sections a policy of co-operative progress. Once more was the point stressed of everybody who was connected with the sale of electricity being himself a profound believer in its merits and usefulness.

The president of the E.C.A., MR. H. C. HAZEL, reinforced Mr. Morrison's strictures upon backward electricity supply undertakings, and showed that not only was it essential to have assisted-wiring schemes available in every district, but that these schemes should possess some measure of uniformity with regard to materials and workmanship. This led him to further advocacy of a national wiring code, which to all good contractors is a consummation devoutly to be wished. Mr. Hazel next contended that valuable as existing propaganda methods were they could not be relied upon to bring about the Electrical Age. He urged the industry to assist E.D.A. to establish the "Central Bureau of Electrical Service" which has so often been talked about.

SIR HUGO HIRST went further than this by suggesting that something bigger than the E.D.A. was necessary to bring about the establishment of three or four "Electric Demonstration Palaces," in the principal centres of the country, which recalls our own suggestions for big central depôts where every kind and make of domestic electrical apparatus could be seen at work and their prices ascertained. Only by means of such Palaces, said Sir Hugo, could the public be brought to a realisation of the possibilities of electricity. A further and equally valuable suggestion was also advanced by the same speaker. Having repeated his belief that electricity could revive and rejuvenate the older industries, he maintained that industrialists could only be convinced of this if electrical engineers prepared special schemes after an exhaustive study of conditions in each industry, in co-operation with those engaged in that industry. Enough has already been done in this respect by his own company and other leading electrical concerns to prove the soundness of the doctrine, but the scope is still immense.

Here are two definite lines of advance; in the domestic sphere general education on a scale never before attempted; and in industry the individual education of owners of factories, mines, railways, and other undertakings to which electrification can be successfully and economically applied. The E.C.A. is to be congratulated upon having held a function which, while socially delightful, has also yielded propositions which the several sections of the industry may well seriously discuss together.

Gas and Electricity.

THE returns just issued by two large gas companies (the Gas Light & Coke Co. and the South Metropolitan Co.) show that both experienced a falling-off in the actual consumption of gas in spite of an increase in the number of consumers. The mildness of the winter and spring in the first half of the year are blamed, for while there was an increase in the last half it was insufficient to compensate for the early loss. Notwithstanding the progress that is being made in the sale of domestic electricity there is, as we have often stated, room for both agents. The Gas Light and Coke Co. reports an addition of 25,617 to its consumers and an increase of 90,382 in gas stoves sold and let out on hire, but it takes exception in its report to the activity of the Minister of Transport in "throwing the weight of his influence into the scale on the side of the interests of electricity, and, therefore, to that extent to the detriment of gas." This is not the first time that such a criticism has been offered when statesmen have ventured to introduce programmes for encouraging full and free development of electricity in the national interests. The present Minister of Transport has been particularly active this year, and it seems that as the head of the department under which the Electricity Commissioners operate, his advocacy of electrical expansion has been perfectly legitimate.

The Shanghai Undertaking.

WE have always followed closely with much interest and a certain pride the progress made by the electricity supply undertaking in the International settlement at Shanghai, China; indeed, the concern has come to be regarded almost as part and parcel of the scheme of things in connection with British electricity supply engineering. In administration and technical organisation the undertaking has from the outset, formerly as a municipal enterprise, and recently under private ownership, been 99 per cent. British, and what is of particular interest is that it appears that the policy of the organisation in this respect is to be continued now that the concern is under the control of American capital.

We publish elsewhere in this issue an outline description of the Shanghai undertaking, from which it will be seen that the organisation is well to the fore in engineering matters, and it also emphasises the magnitude of the concern, which now outrivals some of the largest undertakings at home in size and output. Apart from other considerations, we hope and believe that our account will be useful in dispelling any idea that may exist that an engineering job in the Far East is necessarily very much out of date and a "dead end."

Technically, the latest major development at Shanghai, station B, is of particular interest. The establishment and running of this section of the works as a separate

base-load station is a creditable piece of work, and the record of its working is well worth the attention of supply engineers; 23.7 per cent. thermal efficiency for the first six months running is no mean achievement. The alterations in the operating conditions of the newer plant afford an interesting comparison with modern practice in this country, while the reason for adopting pulverised-fuel firing for station B, *viz.*, because of the wider scope with regard to choice of fuel for the station as a whole makes a special appeal.

There may be stronger reasons in China for the purchase of fuel on a calorific basis than in this country, so rich in reliable fuel, but the urge at home in authoritative quarters for this method of buying coal gives an added interest to the practice at Shanghai.

Bankers and Industry.

WHILE it must be agreed that bankers have a point of view which is not always identical with that of industrialists, a great deal of weight attaches to the speeches of the chairmen of our leading financial institutions at their annual meetings, which are held at this time of the year. These speeches cover a wide ground in an endeavour to relate many causes to various effects.

This year considerable attention has been paid to the question of wages and costs of production. Although there has been general agreement that wages (and therefore costs) are higher than existing conditions warrant, the methods proposed for dealing with this situation are dissimilar. For instance, while the chairmen of Martins and the National Provincial Banks stressed the necessity of reducing wages, the chairman of the Westminster Bank pointed out that it was necessary first to reduce the cost of living to its proper level by investigating and removing the causes of the disparity which exists between the prices paid to producers and the retail prices of commodities. He considered that although a reduction of wages would no doubt lead to a fall in the cost of living, it was necessary that the investigation which he had indicated should come first. MR. BECKETT also said that high wages were not the only handicap upon industry. There was a lack of managerial efficiency and a reluctance to jettison obsolete methods and machinery It is the duty of the electrical industry to overcome this reluctance and to persuade manufacturers that many of their production troubles can be overcome and that costs can be reduced by electrification. This policy was again advocated at the Electrical Contractors' dinner last week by SIR HUGO HIRST, who contends that electricity will prove the saviour of British industry, as steam was early last century. Electrification implies a concomitant reorganisation of methods, and in drawing up the necessary schemes electrical engineers must act in the closest co-operation with the industries concerned and not merely attempt to apply electrical methods to existing systems.

All this means education and an expenditure of a good deal of money. The electrical industry must undertake the first and convince manufacturers that the expenditure is a sound investment.

Overhead-line Regulations.

IT is now nearly three years since the Electricity Commissioners made the last revision of the Overhead-line Regulations. In the view of many these did not go far enough in the direction of reconciling the safety of the public with a reasonably low cost of construction, and since then, owing to the rapid increase of overhead distribution, experience has become available from a larger number of engineers working in more diverse circumstances. The Overhead Lines Association has just completed a useful piece of work in organising discussions for the purpose of placing before the Electricity Commissioners some constructive proposals for modifying the existing regulations.

In order to obtain the right perspective, the O.L.A. discussions should, we feel, be read as a whole, and we have therefore awaited their conclusion before presenting them together in the present issue.

The intent of the regulations is to secure the safety of the public, and not to reduce the cost of giving supplies. The two requirements are, nevertheless, closely related, since it is possible to make provisions so elaborate to meet such improbable combinations of circumstances that the capital cost of distribution may prevent the extensive use of electricity in sparsely-populated areas. Moreover, it was stated that in at least one instance a real danger had been introduced in guarding against one that was more remote.

There are cases in which the regulations have been interpreted in a manner that might not accord with the strictly legal meaning. Where the methods of construction employed adequately fulfil the purpose of securing the safety of the public, the clauses should be redrafted to regularise the position. Then, again, there is the vexed question of the rights of second comer; although the Post Office has agreed not to insist upon the preferential treatment it claims legally, the position is by no means satisfactory.

As any regulations such as those under discussion must be made before their adequacy and their technical and commercial practicability can be tested by experience, it is only to be expected that modifications will be necessary from time to time. Engineers whose duties enable them to form conclusions as to how the regulations can best be made to serve their purpose should, therefore, bring their experience and their influence to the support of an Association in a position to voice their views.

Oil-engine Costs.

THE annual report of the Diesel Engine Users' Association, an abstract of which is given on a later page, contains, as we have come to expect of it, much very useful practical data. Returns of working costs were received from 44 stations (199 engines of from 42 to 1,700 b.h.p.) giving a good variety of results, but the inclusion of a greater number would greatly enhance the value of the statistics. We should therefore like to reinforce the earnest request of the Committee of the Association for prompt forwarding of particulars from all stations using heavy-oil engines to enable the record kept for the past eight years to be maintained.

The need to increase the number of sources of data may be inferred from the increase of more than 20 per cent. in average maintenance costs over the previous year, the increase being accounted for by an exceptional repairs bill at one station, where the expenditure exceeded 40 per cent. of the total for the whole of the home stations reviewed. We should also like to see results tabulated in a similar way for oil engines of the hot-bulb type, none of which are included in the report, but, on the other hand, we may look forward to seeing next year working results from the recent installation of a supercharged engine.

Although an increase in maintenance costs has been noticed as a result of trouble in an individual case, an analysis of the figures available show that with the more modern engines, repairs continue to fall.

Apart from repairs, there was a general all-round improvement in the year under review. The average thermal efficiency (on kWh generated) reached the high figure of 24.7 per cent. with an average running-plant load factor of 64.7 per cent. The maximum thermal efficiency for oil-engine stations given in the Electricity Commissioners' returns, it will be recollected, was the 29.94 per cent. attained by the Buxton Corporation.

Development in South Africa.

WE publish on another page some extracts from an article by MR. E. POOLE, A.M.I.E.E., assistant borough electrical engineer, Durban, contained in the November "coming-of-age" number of the *Journal* of the South African Institute of Electrical Engineers. In making a comparison of the electricity supply development in the Union with that in the Mother Country, there are two outstanding features, widely divergent. One is the close resemblance in engineering practice and matters of general policy, domestic supply development, rural electrification, &c., and the other is the widely differing supply conditions bearing on the nature of the country, resulting in half the total output of 350,000,000 kWh being supplied by only two undertakings.

Electricity Supply in Shanghai.

An outline description of the undertaking of the Shanghai Power Co., with particular reference to the latest extension of the electricity works, Riverside Power Station B.

SHANGHAI, which only eighty years ago was merely a cluster of houses on the river bank, is now the sixth largest port in the world, and the foreign settlements, namely, the International Settlement and the French Concession, may be rightly described as model. The International Settlement is a strip of land on the north bank of the Whangpoo River, approximately nine miles in length and varying in width from one to two miles, with a population of about 30,000 foreigners and 810,000 Chinese. The electricity undertaking in this settlement has played a major part in the rapid development of the port generally, and of the foreign settlements in particular. The administration and technical organisation of the undertaking has from the outset been 99 per cent. British, headed for twenty-eight years by Mr. T. H. U. Aldridge, M.I.E.E., as engineer-in-chief and general manager of the Municipal Electricity Department, latterly vice-president and general manager of the Shanghai Power Company, who, upon his retirement in December, 1929,* has been succeeded by Mr. C. S. Taylor, M.I.E.E., formerly deputy engineer-in-chief and manager of the undertaking when it was under municipal control.

The history of the municipal undertaking dates from 1893. In 1913, when the Riverside power station, with a capacity of 4,000 kW, was commissioned, the old station at Fearon Road had a capacity of 6,400 kW, and the maximum system load was 8,100 kW. The demand increased rapidly from that time, and in 1929 it had reached about 112,000 kW, with a load factor of about 63 per cent., when 535,787,562 kWh was sold.

Fig. 1.—A Section of the Bund, Shanghai.

As the result of negotiations early in 1929 between the Municipal Council and the American and Foreign Power Company, the undertaking was sold and transferred in August of the same year, and is now under the control of the Shanghai Power Company.

The power-station site is on the north bank of the Whangpoo River, approximately five miles from, and east of, the Bund in Shanghai, fig. 1, and occupies an area of 17 acres. To cater for future plant requirements an area of 15 acres of land, adjoining the existing site, has been recently acquired.

The turbo-alternator plant installed now totals 161,000 kW, and the boiler plant has a total normal evaporation capacity of 1,880,000 lb. per hour. The extensions which have been made from time to time have resulted in the station now being in four working sections, the three earlier ones being station A and the latest one station B at the north end, fig. 3. In considering the fourth extension, it was decided to make marked departures from the operating conditions of the then existing plant, as will be seen from Table I on p. 227. This extension, station B, is operated as a separate base-load station.

Nearly 480,000 tons of coal was consumed in 1929. All the coal is sea-borne from Northern China and Japan, and is purchased on a calorific basis. The vessels anchor in midstream opposite the station's foreshore and wharf, and delivery is taken into the company's 200- to 300-ton steel lighters. The coal is discharged from the lighters by three electrically-driven coal transporters of 40, 70, and 100 tons per hour capacity, fig. 2, and is conveyed from automatic weighing machines on the transporters to storage or the bunkers by means of bucket and belt conveyors. In addition to the necessary storage margin between plant demand and deliveries, a large stock, deposited and reclaimed by basket-carrying coolies, is maintained, but this is regarded entirely as emergency coal for use in the event of strikes or other industrial troubles.

Ashes are deposited direct into ash-tipping trucks, which are shunted by electric locomotives to a special wharf, from which they are discharged into hopper-bottom steel lighters and finally dumped in deep water near the mouth of the Yangtse River fourteen miles distant from the station.

The boilers in the first three sections, station A, are coupled to a common range and operate normally at a steam pressure of 200. lb per sq. in., 600 deg. F. In Section 1 there are four Babcock & Wilcox land-type 22,000-lb. (normal) boilers equipped with Green economisers, chain-grate stokers, and induced-draught equipment, and four 28,000-lb. boilers of similar make and similarly equipped. Section 2 is equipped with eight B. & W. marine-type 40,000-lb. boilers, all fitted with superimposed steel economisers and balanced draught; chain grates are employed on six boilers and Riley retort stokers on the other two. Five B. & W. marine-type and five Stirling tri-drum 80,000-lb. boilers, all equipped with superimposed steel-tube economisers, are housed in Section 3; eight of these are fitted with Riley retort stokers and two with B. & W. chain-grate stokers, while Howden-Ljungström preheaters have also been added to eight of the boilers.

The boilers in Section 4, the B station, operate normally at a steam pressure of 375 lb. per sq. in., 700 deg. F., to meet the requirements of the

* See ELECTRICAL REVIEW, January 31st (p. 218) and February 5th (p. 262), 1930.

higher-pressure turbo-alternator sets, and are connected to the 200-lb. per sq. in. steam range through reducing valves and a steam desuperheater. There are four 140,000-lb. water-tube boilers in this section, two B. and W. and two Stirling, fired with pulverised fuel on the "Lopulco" system, and fitted with Murray-fin tubes at the side and back walls of the combustion chambers, and vertical fin-type burners. They are also fitted with steel-tube economisers and air preheaters, three of the latter being tubular, and the fourth of the Howden-Ljungström vertical types. Forced and induced draught are provided, while in the preparation plant Raymond mills and screw conveyors have been adopted.

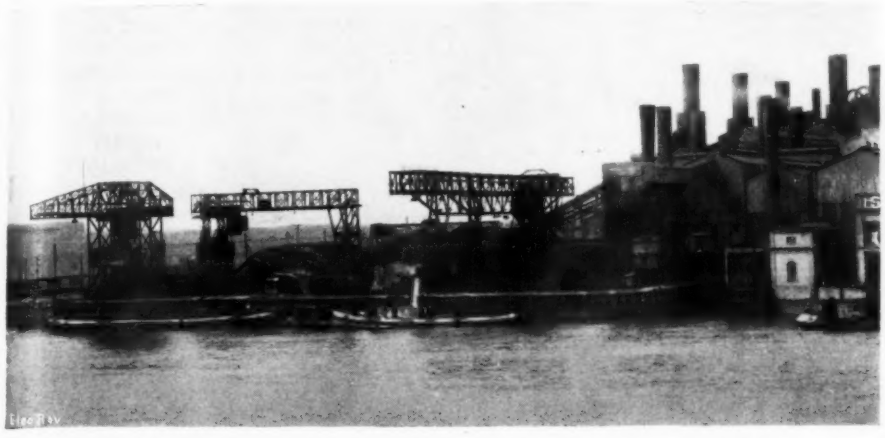

Fig. 2.—The Station from the River, showing Coal-handling Plant.

All the controls are located on the operating floors of the boiler houses, fig. 4, and each boiler is fitted with a feed-water "Venturi" meter, CO_2 meter, steam-flow meter, temperature indicators and recorders, and other apparatus necessary for the efficient operation and heat-balance data. With the exception of the first section, the feed-pump equipment is contained in a bay between the turbine room and boiler house. All the normal-duty pumps are of the rotary type, electrically driven and steam-turbine driven, and reciprocating types are available as stand-by. The feed system from the condensate pumps to the feed pumps is enclosed, the feed tanks are steam sealed, and the condensate is admitted at the bottom.

Feed heating in A station is effected initially by passing all the condensate through the condenser of the running house-service turbo-alternator, and further by the exhaust steam from the air ejectors of the main condensers. The final temperature at the economiser inlet averages 195 deg. F. The feed water system in B station is entirely separate from that in A station, with the exception that in emergency the feed tanks can be coupled up through a common bus pipe, and initial feed heating is effected by stage bleeding. On one turbine set two-stage bleeding is employed, with the heaters placed between the condensate-extraction pump and the feed tanks, and on the other set three-stage bleeding is employed, two heaters being located between the extraction pump and the feed tank, and the third heater on the discharge side of the boiler feed pumps. The average temperature at the inlets to the economisers is 220 deg. F. As a further precaution against aeration the make-up water of the feed system is admitted *via* the main condensers.

The turbo-alternators in A station operate at 195 lb. per sq. in., 600 deg. F., and the ratings (continuous) and makes of the twelve sets are as follows: one 20,000-kW Parsons; one 20,000-kW Metropolitan-Vickers; two 18,000-kW I.G.E.; one 10,000-kW Parsons; two 10,000-kW I.G.E.; one 5,000-kW Fraser and Chalmers (G.E.C.); two 3,000-kW Metropolitan-Vickers (house-service sets); two 2,000-kW A.E.G. All the condensate-extraction pumps are of the centrifugal type, and are electrically driven, with the exception of two stand-by pumps for which steam-turbine driving has been adopted. For all the large generating units the pumps are in duplicate. For air extraction steam ejectors are now used throughout. The condensers are all of the surface type, those of the larger units being split to permit of cleaning without taking turbine sets off load. The circulating water system is syphonic, the condensers discharging into a common underground culvert.

The turbine room of station B, fig. 6, contains two 20,000-kW (m.c.r.) Metropolitan-Vickers turbo-alternators, twin-cylinder, 3,000 r.p.m., which are designed to operate at a steam pressure of 300 lb. per sq. in., 700 deg. F. Electrically-driven condensate extraction pumps, in duplicate, split condensers to facilitate cleaning, and steam air ejectors are employed.

Each turbo-alternator set is fully equipped with the instruments necessary for efficient operation, while the turbine house is fitted with calibrated test tanks which can be connected through a system of piping to any turbine set for the purpose of checking meters and/or obtaining accurately at any time steam-consumption data.

Fig. 3.—Riverside Power Station; Baseload Station B at Near End.

The circulating water is drawn from the Whangpoo River, which is tidal and has a maximum rise and fall of 12 ft. The pumping plant is situated on the river bank, and is divided into three sections containing in all eleven 20,000-gal. per min. and two 35,000-gal. per min. pumps, nine Allen, two Worthington, U.S.A., and

two Mather & Platt. Travelling screens are fixed at the mouths of intake channels to supply Nos. 1 and 2 sections, and stationary screens cover the intake for No. 2 section. All the pumps are of the centrifugal vertical-spindle type, a.c. motor-driven, and are contained in concrete chambers.

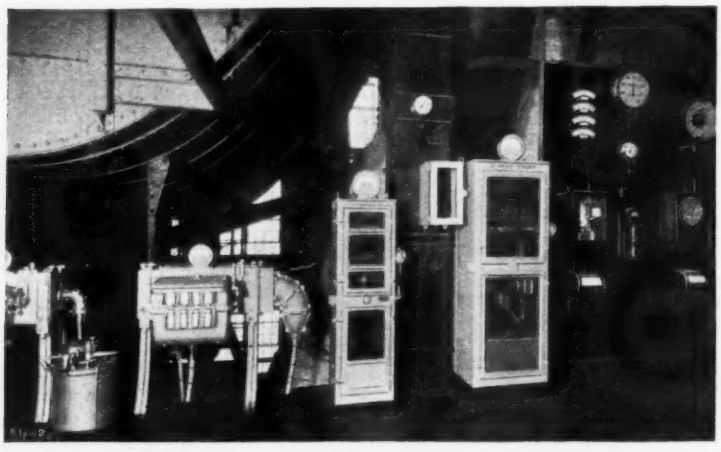

Fig. 4.—A Typical Boiler-house Instrument and Control Board.

All the alternators generate at 6,600 volts; four of the smaller sets are connected to the 6,600-volt section, while the remainder, with the exception of the house-service sets, supply energy to the 22,000-volt sections through step-up transformers, with switchgear on the 22,000-volt side only. The two house-service sets operate at 6,600 volts, and are connected to the station auxiliary switchboard, which is also connected by step-up transformers to the 22,000-volt section. The large alternators are cooled on the enclosed system.

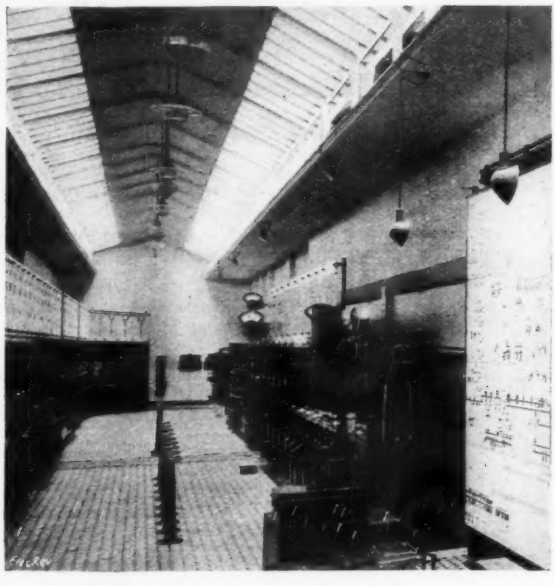

Fig. 5.—A View in the Control Room.

The main step-up transformers are located in a bay between the turbine room and switch house, fig. 7, where facilities are provided for quickly replacing transformers. The oil-cooling and purifying plant is located below the transformers.

There are two adjacent switch houses, one containing 6,600-volt and the other 22,000-volt main switchgear. The whole of the switchgear is of the cellular type supplied by the International General Electric Co. and the British Thomson Houston Co., Ltd. The cable trifurcating boxes and lightning arrestors are contained in the basement, the bus-bars, isolating and selecting links, protective gear and instrument transformers are on the first floor, the oil switches and reactances on the second floor, and oil-switch operating mechanism on the third floor. The main 22,000-volt bus-bar is sectionalised, and is equipped with reactors which can be introduced between sections, the allocation to each section being approximately 20,000 kW. The control room, fig. 5, is situated between, but quite separate from, the turbine and switch houses. A diagram of the whole of the h.p. network, with hand-manipulated disks to indicate the positions of switches, &c., forms a part of the control-room equipment.

With the exception of two circulating-water pumps, which operate at 6,600 volts, all other electrically-driven auxiliaries are supplied at 350 volts a.c., or 440 volts d.c., the latter being employed in all cases in which speed control is required. Rotary convertors and motor convertors are employed for the necessary conversion for the auxiliaries.

Well-appointed repair workshops and a laboratory fully equipped for the complete analysis of coal, water, oil, and so on, are outstanding features of the station.

The deciding factor in adopting pulverised-fuel firing for station B was that it would open up a much wider field in the choice of fuel. During the first six months of 1930 over 160 million kWh was generated in this section, or over 49 per cent. of the total output of the station. The B.th.u. consumed in this section in the same period per kWh generated amounted to 14,390, representing a thermal efficiency of 23.7 per cent.

The primary distribution of the undertaking is at 22,000 V, 3-phase, all by underground cables to six primary sub-stations varying in size from 9,000 to 40,000 kVA each. In these sub-stations the pressure is stepped down to 6,600 volts and distributed mainly by underground cables, and in the outlying districts by overhead lines, to secondary distribution and consumers' sub-stations. From the secondary distribution sub-stations the 350/200-volt 3-phase overhead network is fed by step-down transformers and underground low-pressure feeders, or by underground h.p. radial feeders and pole transformers.

Three of the primary sub-stations, Yangchow, Fearon, and Tonquin, are each equipped with three 12,600-kVA banks of transformers and concrete cubicle-type 22,000-V and 6,600-V switchboards. Voltage and power-factor regulation are effected by the use of syn-

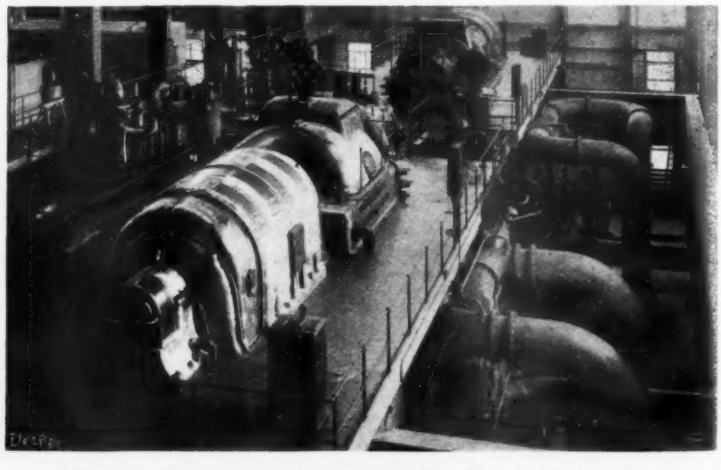

Fig. 6.—The Two 20,000-kW Turbine Sets in Station B.

chronous condensers of 3,600 and 6,000 kVA capacity; at two of these sub-stations the condensers are utilised as the drives for traction generators. The Connaught Road sub-station, which has only recently been placed in commission, is equipped with four 7,500-kVA, 3-phase outdoor transformers, and direct connection is made between these and the main 22,000-volt incoming feeders.

The secondary sub-stations are equipped with either concrete cubicle or metal-clad type 6,600-V and 350-V switchgear, and step-down transformers, 6,600/350/200 volts, 3-phase, of 325-, 625- and 10,000-kVA standard sizes. Where necessary, induction voltage regulators are used.

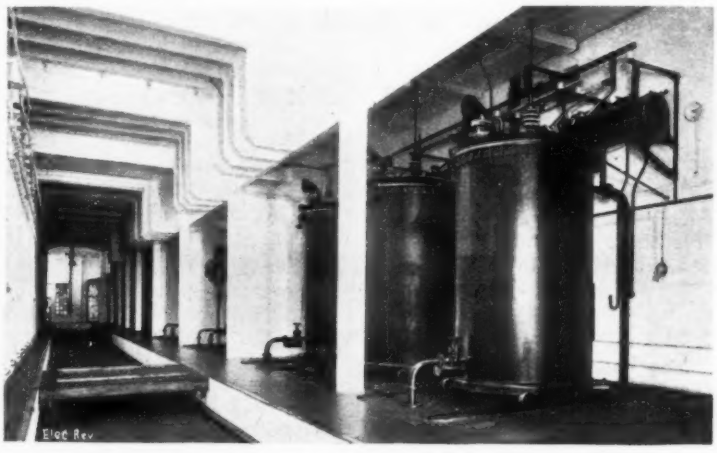

Fig. 7.—The Step-up Transformer Bay at Riverside Station.

The 22,000-V underground cables are all of 0.15 sq. in. or 0.2 sq. in. sectional area. The more recent cables are of the H.S.L. type. The 6,600-V cables are of 0.025, 0.1, 0.2 and 0.3 sq. in. standard sizes, and the l.p. cables are of 0.25 and 0.4 sq. in. standard sizes, 4 core.

The l.p. networks and services are all overhead, except in the cases of supplies to large buildings. The network is mounted on square wood poles, 10 in. by 10 in., standing in concrete bases, fig. 9, the phase spacing being 11 in. flat horizontal. The standard sizes of bare copper are 0.15, 0.2 and 0.3 sq. in. The service wires are

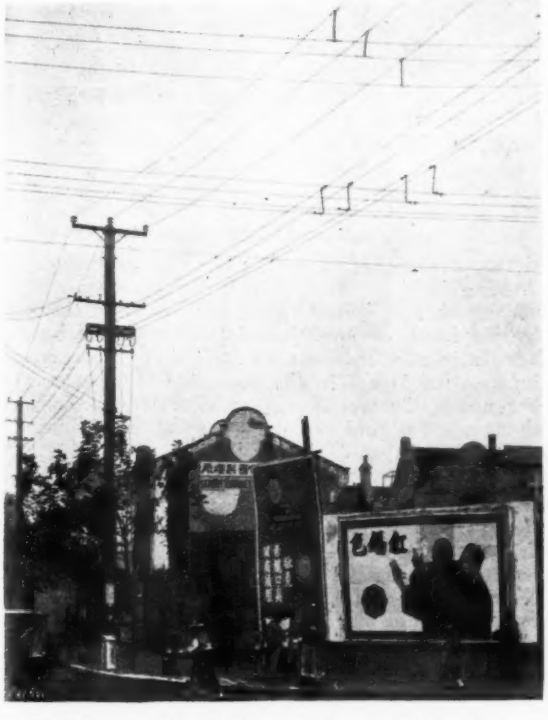

Fig. 8.—Overhead Lines at Street Intersection, showing Flying Jumpers.

weatherproofed with compounded triple braiding. The 6,600-V lines in the outlying districts are mounted on the tops of the poles, the street lighting and the l.p. networks being arranged underneath in the order given. The street lighting is all on the series constant-current (7.5-ampere) system fed by 15- and 20-kW regulators, and practically all the mains are overhead, and bare and weatherproof cable is used.

Owing to the large radius used at street intersections it is practically impossible to use any form of corner pole, and instead the lines of both routes are carried straight through, but are so spaced that the circuits of one route cross the respective circuits of the other route with about 1 ft. 6 in. clearance. At the crossing point the lines are connected by means of flying jumpers, which makes a neat and cheap construction, keeps all poles well clear of the corners, and reduces the number of stays. Fig. 8 shows this arrangement in use at a crossing where both 6.3-kV, public lighting and l.p. circuits are involved.

The company employs 3,000 Chinese and 80 Russian workmen supervised by a staff predominantly British and numbering approximately 200. The organisation is such that, in addition to operation and maintenance, extension work is carried out by this staff with regard to both construction and design.

TABLE I—(see p. 224).

	"B" Station extension.	"A" Station existing plant.
Steam pressure at turbine ...	350 lb./sq. in.	195 lb./sq. in.
Steam temperature at turbine	700° F.	600° F.
Turbines	Twin cylinder, 3,000 r.p.m.	Single cylinder, 1,500 r.p.m.
Boilers...	Pulverised-fuel firing equipment	Chain-grate and under-feed retort stokerequipment
Feed heating	Turbine stage bleeding	Exhaust steam heating from turbo sets supplying auxiliaries

Fig. 9.—Concrete Pole-bases, showing Cradles.

We are indebted to Mr. C. S. Taylor, vice-president and general manager of the Shanghai Power Co., for the information from which the above notes have been extracted.

Keeping Delivery Promises.

Some methods employed to ensure that delivery promises are kept, with special reference to scheduling and date planning.

By A. W. WILLSMORE, F.R.Econ.S.

ONE of the main objects of scientific factory management is the establishment of machinery to ensure that delivery dates are kept as short as possible. Broken contract dates inevitably lead to discontented customers and probably to the loss of their future business, and many a company has been forced into liquidation through inability to fall into line with competitors' delivery possibilities.

Apart from their effect on future business, long deliveries are a serious drag on the finances of a company. A good measure of the efficiency of an undertaking can be obtained from a consideration of the rate at which the concern turns over its investment. Normally speaking, a company cannot expect complete payment for a contract until the job has been completed and the goods have been delivered. While the work is proceeding through the shops, an investment is being built up which the company cannot liquidate until the contract has been completed. Obviously, then, the longer the time taken to manufacture the particular product, the longer will the company be carrying the investment involved, and any steps taken which result in a reduction of the manufacturing period must have a valuable effect on the net return on investment.

There are two distinct elements in factory administration, one involving the making of advance preparations before the receipt of orders, the other entailing day-to-day arrangements to deal with orders as they are received. The relative importance of these two factors depends on the type of product manufactured by the company, although both are essential whether the output is devoted to standardised products or to equipments varying with each particular order.

In the case of a firm manufacturing goods for sale from stock, advance preparations, in the form of a production budget, can be carried to such an extent that goods are already in stock to meet anticipated orders before they are actually received. This condition is achieved by planning shop production on the basis of a careful estimate of future business. In a recent article on the subject, it was pointed out that by planning production in this way it is possible to maintain an even load on the manufacturing plant and at the same time keep delivery periods short with a minimum investment in work in process and stocks.

So far as the company manufacturing equipment on special orders is concerned, however, the production budget offers only a partial solution to the problem. In such a concern, the production budget is necessary to guide the making of such advance preparations for production as the provision of additional plant to cater for any anticipated extension of business. Further, arrangements can frequently be made to enable the manufacture of certain standard items to proceed in advance of actual orders, in the same fashion as in the other type of company. But the real problem in the special order company is the arrangement of the best possible method for passing the work through the shops after the customer's order has been received.

Incidentally, it must be appreciated that many firms in the electrical industry represent special order industries so far as one part of their output is concerned and standard product industries so far as the other portion is concerned. In such instances, different production control methods must be adopted for the two branches, so that the company will operate on the basis of stock orders for that equipment which is of standard design, and on the basis of scheduling and date planning for the special order side of the business.

From its nature, a factory of the special order type cannot carry a very large stock of finished parts. Moreover, the work in such a factory does not move automatically along a standard sequence of operation. Each job frequently requires a different process of scheduling and control of material through the shop, and in the majority of cases, the work cannot be started until the customer's order is received.

The object of production planning in such a case is to arrange the best method for controlling the flow of material through the factory. This usually entails the setting up of a special planning department, whose function is to decide what work is to be done, and when, where, and how it is to be done. To achieve this object, the planning department prepares a schedule for each order as it is received, and lays out the work involved so as to regulate and control the progress of each machine or producing group, and to ensure that arrangements are made to have the next job ready for each particular operator before he has finished the job in hand.

Shop schedules must be based on two sets of information. On the one hand, it is necessary to know the jobs to be completed and their completion dates, together with the amount of work to be done in each process involved. On the other hand, the planning clerk must know the available capacity in the factory after allowance is made for jobs already scheduled. This involves the preparation of assembly diagrams or route sheets for each job, showing the time at which the respective operations must be completed to finish the job on time.

The preparation of a reliable route sheet for a job, showing all of the principal operations to be performed, and indicating the date by which they must be completed, obviously presupposes a fairly accurate knowledge of operation times. In many instances this information is not in the possession of the executive, but unless the manufacturing situation is constantly changing, the time and money spent in obtaining it would be well spent.

Having prepared the dated route sheets, the next step is to pass this information to the shop foreman. In the case of smaller factories, copies of the route sheet are sent to each foreman, thus giving him the earliest possible information as to when his particular section of work in connection with each order has got to be completed, and also where the jobs are coming from. Where the factory is large, and the number of orders consequently greater, the planning department usually carries its work a step further by reclassifying the information on the individual route sheets to bring together by machine groups all the various orders to be done by each individual machine group. The job programmes are thus converted to machine programmes.

One of the most simple arrangements for this purpose is the Taylor planning board, which consists of a number of pockets, each representing a particular machine, and each split into two or three sections

Time cards or instruction cards for each operation are made out by copying the data from the route sheets, and these cards are filed in the respective machine pockets in the order in which they are scheduled for the machine. With such an arrangement, the foreman has only to go to the planning board when he has finished a job to obtain instructions for the next job, and at the same time he can see exactly what work is in front of him. Further, in the event of any physical change in the schedule of a particular job, it is only necessary to rearrange the cards in the pockets representing the affected machines.

Since the various orders in the factory have thus been converted to machine programmes, it is necessary to have some method of recording the progress and present location of each job. It would, of course, be possible to locate the job by tracing it through each operation on the basis of the route sheet, but usually it is more convenient to keep a progress record, checking each operation as it is completed, and showing exactly the location of the job.

On the basis of these progress records, "chasers" can periodically check up each order in the shop to see that it is proceeding satisfactorily and according to schedule. This step is very necessary to avoid jobs being overlooked, and to counter the fact that the shop foreman looks at the situation from the point of view of machine programmes rather than shipping dates. Given efficient scheduling, however, this chasing, or follow-up work, will not be excessive. On the other hand, weak scheduling inevitably leads to the need for an excessive follow-up, so that the balance between follow-up and scheduling provides a good measure of the reliability of the planning methods.

Date planning along the lines indicated in this article admittedly involves an increase in overhead costs. It is found in practice, however, that this extra cost is more than offset by the improved efficiency of manufacture resulting from its operation and by the reduction in the number of overdue orders following its adoption.

Points and Problems for the Engineering Industry.

By D. A. BREMNER, O.B.E., M.I.Mech.E., M.I.E.E.
(Director of the British Engineers' Association.)

IT is not the intention of the writer to add to the number of annual reviews of the engineering industry, or to run the risk of exhausting the interest of the reader and distracting his attention from the main argument by quoting a lot of statistics. Such reviews and statistical digests are available elsewhere and are already familiar to those whose interest in the engineering industry is likely to induce them to read this article.

Nor will an attempt be made to predict what the New Year, 1931, has in store for the engineering industry of this country, the simple reason being that the prospects for 1931 are unpredictable, owing to the extreme uncertainty of future world-wide political and economic events and conditions affecting the volume of active purchasing power, its application and its distribution between the nations of the world. The only thing that can be said with certainty is that the outlook is unpromising.

Fortunately for those engaged in it and for the national economy, the electrical engineering industry has well maintained its export trade during the last four years, and has enjoyed exceptional home market conditions arising from the large expenditure of the Central Electricity Board.

Without detracting in the least from the credit due to the electrical engineering industry in respect of its technical and commercial achievements, it may be said that it has enjoyed very favourable conditions as compared with other branches of the engineering industry. These relatively good conditions and their financial results have tended quite naturally to create a feeling of confidence and even of self-satisfaction, in which there is a risk that the electrical engineering community may regard itself as being something superior and apart and expect immunity from industrial disaster. This, however, would be a most dangerous belief to encourage, because eventually the electrical industry would inevitably share the ill fortune of British industry as a whole.

For this reason, the electrical engineering industry dare not be indifferent to the ills of other branches of engineering industry, or fail to play a part in solving the national and international industrial and economic problems now menacing civilisation. On the contrary, it must be hoped that it will play a leading part, worthy of its importance in the life of modern civilised communities and of the highly-educated and trained brains of its leaders.

The limited purpose of this article is to draw attention to some of the bigger questions and issues demanding the consideration of all engineering industrialists and calling for the exercise of a high standard of industrial no less than of political statesmanship.

Nowadays, many potent forces affecting the fortunes of engineering firms reside outside their works and offices, and are quite beyond the control of the administration. Some of these forces, and not the least of them, have their origin and being outside this country, though their geographical remoteness no longer protects us from quickly feeling their effects. This is the price we pay for modern facility and speed of communication whereby the whole human race has become, in a sense, a single complex organism, whilst remaining without centralised brain control and functioning confusedly in obedience to the impulses and dictates of innumerable uncoordinated brain centres, each of which arbitrarily exercises its individual will for good or evil and transmits the effects almost instantaneously to every part of the whole body. The annihilation of distance and time. It is a new and tremendous fact, which with all its implications has to be recognised and faced as one that touches and influences the lives of all people and nations in a degree more or less proportional to their civilisation.

The more important of the forces and conditions in this country beyond the control of the industrialist are: national financial and monetary policy with respect to gold, currency and credit, and international exchange; fiscal policy; Empire trade policy; foreign policy; taxation; legislation and departmental action affecting industry and commerce; politically-inspired restrictive

and anti-capitalist actions of the trades unions; inequitable and economically unsound adjustments of wages levels, more especially as between sheltered and unsheltered and skilled and unskilled workers; the cost of transport; retail profiteering as affecting the cost of living and wage levels.

Examples of important forces and conditions external to this country and, therefore, beyond our own direct control are: foreign tariffs, Customs restrictions and other artificial trade barriers; international financial policies and transactions; international politics as affecting trade relations between countries; the inequitable international distribution of the burden of war debt; German reparations; and last but not least the machinations of the Soviet Government against the British Empire and British interests throughout the world.

Although these external causes are beyond the direct control of the British Government, they are nevertheless susceptible in varying degrees to the acts and influences of wise and courageous British statesmanship.

To the reflecting reader it is scarcely necessary to remark that none of the above mentioned forces or conditions residing outside its own works and offices can be removed, or modified, by the actions of an individual company or firm. But it may be permissible to point out that, as they powerfully affect the fortunes of British industry, they cannot safely be ignored or trustfully left to the care of "George." It is, therefore, the plain duty of the responsible heads of all engineering concerns to see to it that whatever action may be possible and proper in regard to any of these vitally important matters is, in fact, taken by or on behalf of the industry. As this can only be done collectively and through the agency of a representative and efficient organised body, it behoves them to make their respective contributions of financial support and personal service towards the maintenance of such a body in a state of robust vitality and efficiency.

It is so long since Great Britain was the workshop of the world that it is only a memory of a past non-recurrent state of things possessing merely historical interest. First we had to share the export markets with Germany, Belgium, the United States and Japan, and later also with France, Italy, Czecho-Slovakia, and Switzerland.

More recently the situation has undergone a further change unfavourable to us, in that several previously non-engineering countries, including even our own Dominions, have established engineering manufacture and are developing it within their own borders. These countries include Canada, India, Australia, South Africa, and to some extent the South American Republics.

Russia is a special case. The Soviet Government, by playing on its urgent need of orders and appealing to its competitive cupidity, is rapidly acquiring from the engineering industries of other countries the machinery and plant with which to launch a powerful attack on their interests. Whatever profits may ultimately be received on these sales to Russia may prove to have been dearly bought.

The spread of engineering manufacture in various parts of the world sometimes regardless of what were formerly thought to be natural and economic limitations is due to a combination of causes. No nation would be content to rely entirely on external sources of supply for its munitions of war, and regardless of purely economic consideration it will make an effort to become independent to the greatest possible extent. Furthermore, the possession of mechanical munitions of war, even though purchased abroad, necessitates the training of native personnel to use, maintain and repair them. This in itself tends to engender the engineering spirit. Another potent cause is the inherent attractiveness of engineering, the products and achievements of which are in daily evidence in most countries. The fact that machines and other products of engineering industry are imported into a country for industrial, commercial, domestic and luxury purposes necessarily results in the growth of trained personnel to erect, maintain, repair and operate them. From this to home manufacture is often but a short step, and there is a strong inclination to take it even in the face of unfavourable economic conditions. The dominant fact is that man does not live by bread alone, and that, as in the case of the individual, other than purely economic considerations enter into the scheme of life of a nation.

The implications of all this are that the older and hitherto greater engineering countries—of which Great Britain is one—will be called upon more and more to justify their claims to be the chief seats of the industry. If they possess natural and acquired advantages justifying such a claim, it is not unreasonable to expect that these advantages should find expression in their competitive power. In other words, this great and old-established engineering country of ours should be able to supply more value for money than less favourably situated producers. The advantage offered may take the form of a lower price for a given article; a better article for the same price; or a better article for a higher price economically justified by the degree of superiority.

It is scarcely necessary to remind those who are likely to read this article, that prolonged mismanagement of this country's political, economic and industrial affairs, is making it more and more difficult to offer to our potential customers the advantages upon which the recovery of our export trade must depend.

There would appear to be little prospect of any substantial improvement in the national economy as a whole, unless and until the leaders of industry and commerce play a greater part than heretofore in the direction of national affairs. In the minority of cases, where the personal qualities and abilities are present, their participation should be direct and personal, but in other cases it were better done vicariously through the agency of selected men possessing the requisite knowledge and abilities to do for capital, ownership and management what is so well and ably done for labour by most of the trade union leaders and Parliamentary representatives of the Labour Party. The spokesmen on the employers' side have not always shone in conference or negotiation. It may be said without any reflection on their personal merits that many successful and prominent men in industry, whilst directing the work of their own concerns with skill and judgment, are incapable of clear exposition, of consecutive argument, or of meeting readily and effectively the challenges of their opponents in debate.

Some of the above considerations may seem to the "practically minded" man to be off the canvas, but on reflection it will be found that their proper place is somewhere near the middle of the picture. Let us, however, descend to the "brass tacks" so beloved by economists of mental effort. In order that British engineering and allied industry may secure the largest possible share of home and export orders for its produce, it is necessary that the selling prices of the latter should be effectively competitive. Experience has shown that our present prices are relatively too high. To redress the position, either our prices must fall, or our competitors' prices must rise. The latter being outside our control and there being little likelihood that our competitors in the export markets will exhibit any haste in reducing their margins of competitive advantage, in response to the appeals and international activities of highly-paid British labour, our safest course is to concentrate on the reduction of our own costs and selling prices, in so far as that may be within the control of British engineering employers. Unhappily, that control is all to limited, many important factors in cost of production and selling price being excluded therefrom, *e.g.*, wages rates; hours of working; trade union restrictions; transport costs; prices of raw materials; taxation; rates; and contributions to labour insurances.

In these circumstances, the means available to the engineering manufacturer to reduce his costs of production and selling prices *for a given output* are practically limited to the following:—

By improvements in design, to effect economies in materials and/or in the direct wages cost per unit of output.

To increase the effective working time of machinery and plant, in relation to the nominal hours of working, by reducing stoppages for changes of work, tools, &c., and waits for material.

The substitution of payment by results for time wages wherever possible.

The improvement of the ratio of direct to indirect wages for a given output.

Economies in the purchase of materials.

Reduction of manufacturing and commercial oncosts.

But the most important thing of all is to increase the volume and the regularity of volume of the output, and this is only partly within the control of the manufacturer himself. To the extent that it is within his control, it is dependent on the suitability of his goods for the markets available, their qualities and his salesmanship, but these will not suffice unless the prices at which they can be offered are effectively competitive.

For the reasons stated above, it may be that his prices cannot be brought down to that level, in spite of a highly efficient standard of performance in respect of every factor of production and selling costs actually within his own control.

In the attempt to cope with the difficulties of the situation there has been a prodigious output of words, and in order to awaken new interest in old ideas and even older economic virtues new names have been coined for them. The words "rationalisation" and "mechanisation" have been used almost *ad nauseam*, while "salesmanship," without rebaptism, has been preached with a fervour worthy of a new gospel. There has been much laborious and roundabout rediscovery of the obvious or of the well known. Nevertheless, the net effect of all this ferment and verbosity, with big sensational headlines in the popular Press, has been for good. Modern psychology responds only to this kind of treatment, and its peculiar characteristics must not be ignored by anyone desirous of influencing public opinion, or of enlisting the support of his fellows in pursuit of a policy.

In the field of action, a considerable amount of commendable reconstructive work has been done by a number of engineering concerns in discouraging circumstances, and in spite of the uncertainties of the future. It remains to be seen how some of the schemes of rationalisation already executed will work out in the long run. A huge complex organism, dependent for its financial health on the proper functioning of a large number of interdependent parts and exposing many vulnerable points, may or may not prove to be best fitted to survive the ups and downs and struggles of industrial life. Furthermore, there would appear to be some risk of these great industrial concerns losing in efficiency by dehumanising industry, so far as staff personnel is concerned. Labour, through its trade unions and political activities, is well able to take care of itself, but there is a danger that the consideration and protection which have been exacted by organised labour may not be graciously and voluntarily extended to staff personnel. The staff employés having none of what the newspapers call "news value," and not being an organised and politically powerful body excite little public interest or sympathy, and in an overcrowded market are very much at the mercy of the employers, who in their own struggles with financial difficulties are prone to take out of the staff personnel what they are unable to save elsewhere. Much is heard about the unemployment of labour which is being so generously relieved, but nothing is heard about the relatively greater miseries of staff unemployment which has attended the depression and the rationalisation of industry. Many of the technical and other staff employés, who are still fortunate enough to be in employment, have been living for some years past in a perpetual state of anxiety and apprehension, damaging to their health, their spirits, and their efficiency.

It is a terrible thing for a competent, well-tried staff employé to find that he has been handed over by a board of directors to the mercies of a strange and ruthless chartered accountant, armed with a cold blue pencil, and moved only by the warm stimulus of a big fee "to effect drastic economies."

Why so-called "Captains of Industry" should have surrendered their powers to hired accountants, who should be the servants and not the masters of industry, is beyond comprehension. They cannot, however, shift their moral responsibilities on to other shoulders, and it may be permissible to commend these very human staff questions to their own sympathetic and understanding consideration. No "rationalisation" scheme will be worth the paper it is written on, if it carries in its train an apprehensive, discouraged and discontented staff.

With regard to "mechanisation," it would be folly to burke the ugly fact that, actually, the extensive mechanisation of industry must inevitably for an uncertain period of time result in a serious increase in unemployment. It is a disaster that the economic need for accelerated and extensive mechanisation of our industries, in order to compete with other manufacturing nations in the markets of the world, should have come upon us at a time when we are already labouring under an insupportable burden of unemployment and taxation. Nevertheless, the pursuit of increased efficiency and lower costs of production must and will continue in any nation that is not already stagnant and approaching dissolution. It would be suicidal to attempt to stop it. But mechanisation should be evolutionary and not revolutionary, particularly at a time when the whole nation is already shaken to its economic foundations by abnormal events and conditions. The time factor is of the utmost importance. The nation might be able to stand, and to benefit by, increased mechanisation of gradual growth, giving time for the complementary readjustments to take place; whereas the shock of an intensive and extensive mechanisation campaign might create greater evils than it was designed to cure.

There is no lack, in this country, of the technical knowledge and skill required to carry out any programme for the mechanisation of industry, but a big programme would entail a big budget of capital expenditure. For this the essential precedent condition is confidence; confidence in the future; confidence that the fruits of brain work, enterprise and capital investment will be garnered. Unhappily, confidence is lacking to-day, and until it is restored the spirit of industrial enterprise and commercial adventure will not be re-awakened.

Furthermore, do not let it be imagined that a greatly accelerated and wide-spread mechanisation of industry or any other single change or reform, however desirable in itself, would be a cure-all for our industrial and economic ills. The beneficial effects of any such change are dependent on other complementary changes and conditions. The potential gains of mechanisation might never be realised. They might be wiped out by labour demands for shorter hours or higher wages, or the new capital investments might be prevented from fructifying because our fiscal system or some other cause made it impossible to secure the regular volume of work required for the economic operation of a highly mechanised factory. The above are only some of the points and problems facing British engineering industry in 1931, and it will be seen that they call for clear wide vision and a high standard of industrial statesmanship.

The Need for Action.

In the course of an article dealing with the world industrial situation in the January issue of "Petter's Monthly News," Mr. P. W. Petter says that everyone engaged in industry in almost every country of the world is only too well acquainted with conditions which seem to baffle all the efforts of the politicians. On the other hand it is no use to sit down under those conditions as though they were imposed upon us by some unalterable law. Our business should be to enquire whether and to what extent improvement lies within our power of attainment.

The Domestic Tariff.

It is claimed that practical difficulties experienced in the use of any single-basis two-part tariff would be obviated by the introduction of a composite basis for the fixed charge.

By C. F. MOUNSDON, A.M.I.E.E.

IN view of the statement of the Committee appointed by the Electricity Commissioners to investigate the subject of "Uniformity of Electricity Charges and Tariffs,"* that "it is unable to point to any basis" (for a tariff for domestic purposes) "as being wholly without defects of some sort," there is ground for concluding that the subject is still open to discussion. Certainly the Committee's finding has not met with unanimous approval—and there is good reason for the disappointment and dissatisfaction that is felt. The Committee has merely reviewed and recapitulated facts which surely have been the common knowledge of many for years, and has chosen a single-basis tariff—one of the very things that has created *all* the trouble and led to the formation of the Committee—whereas it was the hope of those acquainted with the subject that at last there was the chance of bold action being taken for the purpose of encompassing some of the most important factors. As it is, the finding leaves us just where we were, with the bad old system containing all the bad old troubles.

Defects of the Single-basis Tariff.

We realise that no fixed charge can be put forward to cover the extreme diversities of domestic apparatus, apart from lighting, but it is possible, by taking a broad view, to devise some equitable method to encompass those factors (chiefly lighting) which can be dealt with consistently on average. For instance, the Committee, criticising fixed-charge bases, say "The adoption of the rateable-value tariff in lieu of a flat rate is undoubtedly preferential to consumers with low assessments; on the other hand, consumers with high assessments may find that the average price per unit in the rateable-value tariff is higher than the flat rate." Exactly; but precisely the same criticism, with the wording suitably altered, holds good regarding any other single-basis tariff whatsoever, including the one recommended by the Committee. Granted it is a matter of degree, but with any single basis the anomalies are too frequent and too severe. No doubt we hope for the time when the fixed charge will be so low that such anomalies will fade into comparative insignificance, but some considerable time must elapse before we reach such a desirable state of affairs. The Committee's choice certainly does not by any means get rid of these serious anomalies.

This is not the place for a review of the subject of two-part tariffs, but we might remind ourselves of the main points in their history. The first two-part tariffs were single basis, and even at that early date their very serious defects were recognised, and it was that very recognition that led to efforts at something better. Those efforts were of necessity experimental, or something nearly so, but at least they were laudably directed towards greater equity with reasonable simplicity. There were bound to be failures, but in at least some of the cases it needed trial to bring the defects to light. Further, those were the days when the two-part tariff was a new thing, and consumers were shy of it, and, further still, the inequities as between consumers was one of the factors that held up its progress. We are now at a totally different stage, and some of the factors that then had to be taken into consideration are no longer of so much importance, as this method of charging has become an everyday thing known to most consumers; what is now wanted is a reasonable compromise as regards recognised difficulties, not reversion to one of the worst possible forms.

Different Classes of Houses.

It is understood that the function of the greater part of the fixed charge is to cover the standing charges imposed on the supply authority by the lighting average maximum demand. A point missed in Section 77a, however, is the relative demand made by different *classes* of houses. Odious as it may seem, it is necessary to make certain comparisons. One cannot go entirely on comparison of house with house of the same size, but must take into consideration comparison of class with class. The difficulty, however, is that few actual figures showing this are available, and one must be led by commonsense facts. An average house in a highly-rated part of a town or district will have a considerably greater lighting maximum demand than a similar average house in a lower-rated part of the same neighbourhood, though it may differ very little in the total number of active lights. The reason for this is that light in the former is more lavishly used during the peak period. Another point—the load-factor of the houses in the lower rated part of the area will on the average be found to be higher than in the highly-rated part, and one could enlarge on the reasons were they not obvious. Moreover, the average loading and peak load of other apparatus are usually larger in the highly-rated parts of areas. Further, a greater length of distributor per consumer is usually necessary. All these factors point to the conclusion that the Committee has been too unfavourably disposed towards the rateable-value basis, which cannot be dismissed as of no value; when properly used it can be of great value.

Composite-basis Fixed Charge.

It has been the writer's privilege to have been enabled to study closely the very enlightening information produced by the working of a tariff of which the fixed-charge basis is a composite one of three factors, namely, (1) rateable value, (2) floor area, and (3) lighting connections. It will readily be believed that the adoption of three factors in this manner means the smoothing out of the anomalies of each one and produces results which are far more equitable as between consumers than figures based on any one basis taken singly. This accepted, it will follow that the resultant fixed charges may be considered as constituting a standard against which tariffs built on other bases may fairly be compared. (The tariff in question, after being applied for about seven years over a district including one urban and two rural districts, comprising twelve parishes, has not, so far as the writer is aware, produced one real complaint of inequality by comparisons between consumers. This must speak for itself.)

Such a tariff is not by any means proposed by the writer for general adoption, for obvious reasons, one of which is the undesirability of taking lamps into account, but, in view of the certainty that a composite tariff does smooth out the inherent anomalies of its component individual bases, the suggestion now made is that *a composite basis of size of house and rateable value together* would produce a materially more equitable tariff than that based on size of house alone, and, moreover, one that is thoroughly practicable.

* Electrical Review, August 1st and 8th, 1930.

So far, the obvious points relating to equity as between consumers have held the stage, but there is another factor which up to now does not appear to have come to light; it not only touches on equity as between consumer and supplier, but also very materially affects the consumer. To discover this needs an examination of data disclosed by the composite-basis tariff.

Fixed Charges and Revenue.

Anomalies, as has been said, are absolutely inseparable from a single-basis tariff, and the trouble is in the number and severity of them. This means that, in the hypothetical case of all consumers adopting the tariff, there would be some who would benefit at the expense of others. If the fixed charge is too high a number of consumers will be precluded from adopting it, and if it is too low a number of consumers will benefit unduly. In practice it is found that the true average cannot be taken as it excludes too great a proportion of consumers who would otherwise adopt the tariff and increase their use of electricity. Consequently the fixed charge has to be reduced below the economic line. This, unfortunately, not only has the effect of benefiting just those consumers who would have been paying an equitable rate and those who would already have been paying less than an equitable rate, but also causes the supplier to be the corresponding loser. The amount which the supplier thus forfeits is clearly shown from the data disclosed by the tariff referred to above to be from 15 per cent. to 20 per cent. of the total of the fixed charges. This obviously debars the supplier from making reductions to this extent in the general rates which would affect the *whole* of his consumers (domestic, trade and power), and which would again increase output, which in turn would make further reductions in price possible. A second point of importance is brought to light by a comparison of the fixed charges which would be payable by a number of individual consumers under various bases. Taking, for instance, (1) area by outside measurements, and (2) rateable value, cases occur where consumer "A" under tariff (1) would be paying, say, £10, and under tariff (2) would be paying £5, whereas for another consumer (B) the figures might be exactly reversed. Under a composite tariff they would stand more than a sporting chance of being levelled out at about £7 10s. each. Examination of a large number of such cases shows that in practically every instance the levelling-up is an equitable arrangement, having regard to all the circumstances of the cases. No amount of generalisation can dispose of facts, and it may be taken that the foregoing statement of the effect on revenue is definitely borne out by the figures. That is to say, the increase in revenue from fixed charges accruing from a composite basis of area and rateable value is in the region of 15 per cent. to 20 per cent. above that derivable from a single-basis on tariffs designed to be attractive (compared with the flat rate) to an equal number of consumers, while improving the equity not only between "classes" of consumers, but even more especially between individual consumers. This does actually mean that the 15 per cent. to 20 per cent. is available for the benefit of *all* the consumers of an undertaking.

Replies to Objections.

The main objections that may be raised against a composite basis are the additional work imposed on the supply authority and the application of the tariff from the point of view of the consumer. The replies to these objections are:—

(1) From the supplier's point of view the extra work of coupling the rateable-value figure is practically negligible, for, while the measuring of the house and the working-out of the area do certainly mean an appreciable amount of work, taking probably an hour or two of a man's time, the ascertainment of the rateable value and the very slight additional calculation would not involve ten minutes extra time.

(2) The much-talked-of difficulties in dealing with consumers is greatly over-rated. The writer's experience has been that a good tariff does not need explanation. It soon comes to be known, and consumers merely ask for an assessment to be submitted. If, initially, any explanation is asked for, the reply can be reduced to the simple statement that the charge is, say, 5s. per 100 sq. ft. of floor area, plus 1s. 3d. per £1 of rateable value, or whatever the rates may be. The consumer's chief interest is in the *figure*, not in how it is arrived at.

(3) It does not add appreciably to the consumer's work of calculating it for himself if he cares to do so.

(4) The very equity of such a tariff obviates any question or complaint thereafter.

A composite tariff such as this could be balanced to suit almost any district, while still vastly improving the equity compared with a single-basis.

There are, of course, almost bound to be a few exceptional cases, where special conditions call for special treatment, but these few should be treated as exceptions and not be allowed to affect what is best for the remainder of the country. Probably, however, even these could be met by a suitable adjustment of the two bases.

Considerations of Equity.

After all, an assessment once made is *for all time*. A satisfied consumer is worth a little trouble to achieve. Indeed, a supply authority will take no end of trouble to satisfy him on half-a-dozen other points; why then not take a little trouble in such an important matter to him as his fixed charge?

A cry such as "simplicity" can be overdone. Simplicity must not be allowed to oust equity, where equity should rightly hold first place. (Besides, "simplicity," it must again be recalled, is a hoary cry, raised when two-part tariffs were looked at askance by consumers of the old days. Moreover, it is claimed that the tariff now proposed is as simple as is necessary.) Equity *is* important, and when so great an improvement can be achieved at so small an extra cost of time and trouble, then the end more than justifies the means.

The two-part tariff has come to stay. The fixed charge, once made, is a permanent figure, and should be made a fair one. The Committee has done good work, but its report does not cover all the ground, and finality, therefore, is not necessarily reached. Doubtless we are a little tired of the question, but to give up at the last lap with something unsatisfactory is not in accord with the best traditions of the electricity supply industry.

No matter what other factors it may in the future become necessary to take into consideration, such as a block tariff, advocated in a recent article in the REVIEW,* the standing charges caused by the lighting load have at present to be reckoned with, and should be tackled squarely. The block tariff for the secondary charge is an excellent one which undoubtedly meets the views of consumers (they ask for it!) and is worthy of consideration. It can be embodied in a two-part tariff, but it does not pretend to cure, and it cannot cure, the evils of a bad fixed-charge basis. An equitable fixed charge plus a "block" system for the secondary charge is a combination likely to meet with general approval.

Aerial Line Accident.

The pilot of an aeroplane who was flying from the South of France to the London air port at Croydon on behalf of a private firm had a lucky escape on Monday night last when he lost his way in mist and hit a 33,000-volt overhead electric power line carried on steel towers at Dagenham, Essex. The machine was destroyed by fire, but the pilot was happily rescued. The supply of electricity to part of the Becontree district was interrupted until repairs were effected to the overhead line.

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* "The Two-part Tariff," by G. L. Porter. ELECTRICAL REVIEW, November 14th, 1930.

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.

The British Industries Fair.

The chairman of the Electrical Advisory Committee of the Birmingham section of the Fair (Mr. T. R. Martin) has sent us a programme of the functions to which electrical associations will send representatives during this year's Fair which opens on February 16th. These are as follows:—

Wednesday, February 18th.

Luncheon:—
Electrical Wholesalers' Federation Council.

Thursday, February 19th.

Luncheon:—
Institution of Electrical Engineers—South Midland Centre.
Incorporated Municipal Electrical Association—Local representatives.
Association of Consulting Engineers.
Association of Supervising Electrical Engineers.
Electrical Contractors' Association.
Electrical Contractors' Association of Scotland.
Electrical Wholesalers' Federation.
Electrical Merchants' & Manufacturers' Association.
Illuminating Engineering Society.
Municipal Tramways & Transport Association.

Friday, February 20th.

Luncheon:—
Association of Mining Electrical Engineers.

Saturday, February 21st.

Luncheon:—
Electrical Power Engineers' Association (conference in the afternoon).
Tea:—
Students' Section—South Midland Centre, I.E.E.

Tuesday, February 24th.

Luncheon:—
Institution of Electrical Engineers—Council.
Incorporated Municipal Electrical Association—Council.
British Electrical Development Association.
Incorporated Association of Electric Power Companies.
Provincial Electric Supply Association.
Tramways & Light Railways Association.
Tea:—
Electrical Association for Women (Birmingham and Mid lands Branch).
Dinner at the Queen's Hotel:—
Arranged by the British Electrical Development Association.

Wednesday, February 25th.

Meeting and Luncheon:—
British Electrical Development Association, Council.

In addition to the foregoing functions there are others of some, but less direct, electrical interest. On February 17th members of the British Engineers' Association and of the Institution of Mechanical Engineers, will pay an official visit, and on February 23rd the "official" visitors include representatives of the Engineering and Allied Employers' Federation (Birmingham and district).

Visitors requiring sleeping accommodation can obtain assistance from the Accommodation Dept., British Industries Fair, New Street, Birmingham.

British Plant for Holland.

The third and final consignment of plant constructed at the Heaton works of Messrs. C. A. Parsons and Co., Ltd., for the P.E.N. power station of Peverwijk, Holland, has been transported *via* the train ferry at Harwich. The total weight of the plant is 350 tons and consists of turbo-generators built for the station.

Dutch Radio and Lamp Exports.

The Dutch official trade returns show that there was an increase in the exports of radio apparatus and accessories in December, while for the complete year the exports amounted to 10,899 metric tons of the value of 66,328,000 fl., these figures comparing with 10,505 tons and 81,459,000 fl. respectively, in 1929. In the case of metal filament lamps the statistics record exports of 49,450,000 lamps in 1930, against 60,501,800 in the previous year. The value was 22,922,000 fl. against 27,815,000 fl.

The F.B.I. Quarterly Forecast.

"The Business Barometer" of the Federation of British Industries for the first quarter of 1931 reviews the economic events of the past year. With regard to the future, it says that although the indices of business activity as yet show no signs of the lifting of the cloud of depression, it is still possible to hope that the spring will see some improvement. Unfortunately, even if this improvement materialises, it will not mean that real recovery is under way. On the contrary, there is a danger that, if it should become marked, it may encourage premature optimism and so postpone the re-establishment of equilibrium. Many and difficult adjustments still have to be made both in industrial conditions at home and in commodity markets overseas; and, despite the cheapness of money and apparent surfeit of funds, the world's monetary problem remains unsolved. If the close of 1931 finds business conditions sufficiently restored to make a return to normality a practical possibility even as early as 1932, the world will have cause for considerable satisfaction.

The Federation has published a booklet entitled "The Passing of Free Trade" by its economic adviser, Mr. R. G. Glenday. This, it is stated, presents an industrial non-political case for the imposition of import duties upon foreign goods as a means of reducing the disadvantages of heavy social-service charges and high wages; to restore the competitive ability of our export trades; to secure preference for British goods in foreign markets, &c. The booklet is priced at one shilling.

The E.D.A. February Programme.

The February programme of the British Electrical Development Association is devoted, in the main, to electric heating, the window display for the month being a special display of electric fires. The "lay-out" is capable of adaptation to windows of all sizes, and, as in the January display, the "Three Modernist Men" are a prominent feature. The national and local advertising for the month emphasises the advantages of electricity for heating and the use of more plug points, whilst the literature deals with heating, washing and irons. An abridged programme outlining the principal activities of the second section of the Electric Homes Campaign is included, a feature being the organisation of not less than 50 E.D.A. three-plug-point demonstration houses during the period to June next. The Campaign Committee regards the organisation of these houses of such importance that it has arranged to give special financial assistance to Circles, and others who decide to organise these houses.

The Hire-purchase Bill.

At recent meetings under the auspices of the Hire Traders' Protection Association the Hire-purchase Bill introduced into the House of Commons by Miss Ellen Wilkinson has been under consideration, and on January 29th the following resolution was passed:—"That this meeting of representatives of the many trades affected by the Hire-purchase Bill hereby records its uncompromising opposition to the Bill on the grounds that it would operate entirely to the detriment of the public interest."

Supply Workers' Wages at Eastbourne.

The Electricity Committee of the Eastbourne Corporation recently decided, by the casting vote of the chairman, not to put into operation locally the reduction in wages for electricity supply employés announced by the National Joint Industrial Council for the Electricity Supply Industry.

Scottish Contractors' Dinner and Dance.

The annual function of the Edinburgh branch of the Electrical Contractors' Association of Scotland is to be held at the North British Station Hotel, Edinburgh, on February 13th. It will take the form of a dinner, whist drive and dance. Representatives will be present from all branches. Tickets, price 12s. 6d. each, may be had from members of the committee or from the secretary, Mr. Walter Finlay, 55, Frederick Street, Edinburgh.

Social Events.

The second annual carnival supper dance in connection with the staff of the Lancashire Dynamo & Motor Co., Ltd., will be held at Longford Hall, Stretford, on Friday next, February 13th, from 8 p.m. to 1 a.m. All past employés of the company should at once make application for tickets to Mr. W. L. Allison, at the works of the company at Trafford Park, Manchester.

The Manchester Magnet Amateur Dramatic Society which was formed in 1929 and last season presented two short plays before members of the General Electric Co., Ltd., has planned a more ambitious programme for this year. Last night, Thursday, it was to give a public production in the Lesser Free Trade Hall, Manchester, of the three-act comedy, "Passing Brompton Road."

The second smoking concert of the Association of Ex-Siemens' Men took place at Gatti's Resturant, King William Street, Strand, W.C., on January 28th, when about 60 members and their friends spent a most enjoyable evening. The chairman, Mr. G. Palgrave Simpson, gave an interesting survey of the electrical industry in the early days, stressing the team spirit which existed in those days, and which was evidently still existent in the present Ex-Siemens' Association. Mr. G. Palgrave Simpson had this year completed his jubilee of active work with most of the well-known companies in the electrical industry. During the evening an excellent musical programme was rendered by well-known artistes.

The annual staff dinner of Ernest F. Moy, Ltd., was held on January 17th, Major C. G. Fox, chairman of the company, presiding. In proposing "The Firm of Ernest F. Moy, Ltd.," Mr. W. B. Sykes said they could congratulate themselves on the success which they had achieved during the past year, for which thanks were due to all grades. Major C. G. Fox distributed the cricket club prizes and thanked the staff for the past year's work. During the evening musical items were rendered by several artistes.

The newly-formed Amateur Dramatic and Musical Society of British Insulated Cables, Ltd., gave its first musical show on January 28th, 29th and 30th at the company's canteen, Prescot. The long and varied programme included songs, choruses and humorous items, the music being provided by an orchestra under the direction of Mr. W. Boots and Mr. F. Capper.

The Indian Cable Co.'s Sports.

The annual sports of the Indian Cable Co., Ltd., were held on the company's recreation ground, Tatanagar, B.N.R., India, on January 10th. The arrangements for the afternoon, which were made by the Cableco Welfare Association, included 24 events for the employés and employés' children. At the conclusion of the sports the assembly, which included Bengalis, Sikhs, Punjabis, Madrasis, Nepalis, Europeans, &c., gathered at the prize tent, where 69 prizes, including the championship cup provided by Mr. F. W. Leake, chairman of directors, were presented to the respective winners by Mrs. F. W. Leake.

Book Notices.

"Foreign Trade, with Special Reference to the Cotton Trade and to the Payment for a Motor Car from Abroad," by Gilbert Beard (83 pp.). Manchester: John Heywood, Ltd. Price 6d. net.—The "special reference" of this little book's rather clumsy title is an illustration of the mechanism of imports and exports, both visible and invisible, which forms the principal subject.

"The Blue Book—The Directory and Handbook of the Electrical Engineering and Allied Trades." Pp. 1458. London: Ernest Benn, Ltd. Price 25s. net.—Every care has been taken to bring the 49th edition of this most useful publication up to date. Revision has been carried out throughout, and the system of visual indexing has been extended. The general arrangement of the directory is the same as that of the preceding edition.

We have received from Messrs. Tangyes, Ltd., of Birmingham, a small booklet containing a short history of the company with brief details of some of its present products.

"The Practical Electrician's Pocket Book, 1931." Pp. lxxii+560; fully illustrated. London: Odhams Press Technical Book Dept. Price 2s. 6d. net. The thirty-third edition of this pocket book contains new chapters relating to "Commutator Troubles and Their Cure" and "Electro-plating." Six sections have been almost completely re-written and the central station data in which supply details for every important town in the United Kingdom are given, has been thoroughly revised.

We have received from Messrs. FERRANTI, LTD., a copy of the first number of "Lightning," the company's new house magazine. This issue contains many humorous articles and verses, and, as the Editor states, is not written to sugar the pill of sales propaganda, but with the sole motive of interesting and amusing the staff. From a perusal of its contents we do not doubt it will admirably fulfil its purpose. The publication of the first number was recently celebrated by a staff dance.

Circulars of the U.S.A. Bureau of Standards. No. 390. "American Standard Specifications for Dry Cells and Batteries," issued December 10th, 1930. Price 5 cents.

"Slide Rule Calculations," by H. O. Cooper. Pp. 131; figs. 12. London: Oxford University Press. Price 7s. 6d. net.

Publications of the Association of Engineering and Shipbuilding Draughtsmen—Flywheel Design (for Reciprocating engines). By Robt. B. Neilson. Price 2s. net.

Wages in the Engineering Industry.

On January 30th a conference took place in London between representatives of the Engineering and Allied Employers' Federation and of the trade unions connected with the engineering industry. Sir Allan Smith on behalf of the Federation put forward proposals for a 48-hour working week (instead of 47 hours); the reduction of overtime and night-shift rates; and the consideration of the questions of the manning of machines and demarcation. In presenting these proposals Sir Allan Smith said that the employers were of the opinion that if agreement could be reached upon these points their competitive position would be considerably improved. Under existing arrangements the industry was handicapped in comparison with Continental competitors. The matters raised are to be considered by the executives of the 42 unions concerned who will present their reply to the Federation early in March.

A Report on the British West Indies.

The Department of Overseas Trade has published (through the Stationery Office, 2s. 6d. net) a report on economic conditions in the British West Indies by Mr. J. L. Wilson Goode, Trade Commissioner at Port of Spain, Trinidad. This deals mainly, of course, with the agricultural and mineral production of the territories, but passing reference is made to projected electric lighting schemes in St. Vincent, Dominico, Montserrat and British Honduras. An appendix shows that during 1929 Barbados, British Guiana, Trinidad and Tobago, and Jamaica imported electrical apparatus valued at £112,733 (against £105,259 in 1928); of this Trinidad and Jamaica were credited with about £43,000 each. The bulk of this apparatus was supplied by the United States, Great Britain being second on the list with Canada third.

The Contractors' New Home.

The February *Electrical Contractor* says that after many attempts to obtain better accommodation for its Council, committees and staff, the Electrical Contractors' Association has now secured adequate premises at 23, Bedford Square, W.1 (near the British Museum). The actual removal date is to be the subject of a later announcement; in the meantime communications should still be sent to 15, Savoy Street, W.C.2.

Unemployment.

There was a decrease of 15,756 in the number of registered unemployed during the week ended January 26th. At that date the total was 2,592,650, as compared with 2,608,406 on January 19th, and 1,491,519 on January 27th, 1930.

Japanese Competition in China.

Dealing with the subject of Japanese competition with British trade in China a correspondent to *The Times Trade and Engineering Supplement* shows that during 1929 while Great Britain supplied electrical materials and fittings to the value of 1,852,272 taels, Japan's share reached 4,804,185 taels.

The Electrical Merchants' and Manufacturers' Association.

Just over two years ago (November 9th, 1928) we reported the formation of the Electrical Merchants' and Manufacturers' Association by a number of prominent wholesalers and manufacturers. The qualifications for membership were stated to be that "members must properly fulfil the functions of wholesale warehousemen, hold adequate stocks, give preference to British goods, and generally assist sales progress by employing travelling representatives, publishing their own illustrated catalogues and popular literature for the use of the retail trade; and promote the establishment of fair retail prices and uniformity of discounts." On January 15th last the Association was registered as a company limited by guarantee without share capital. The Council was not named, but the subscribers were the following:—Messrs. A. G. Beaver (Sun Electrical Co., Ltd.); R. W. Smith (Drake & Gorham Wholesale, Ltd.); H. H. Berry (Berry's Electric (1928), Ltd.); F. C. Barnett (Wholesale Fittings Co., Ltd.); J. M. Sim (Sloan Electrical Co., Ltd.); L. A. M. McGeoch (Wm. McGeoch & Co., Ltd.); and P. L. Davies (Downes & Davies).

The B.E.A.M.A. Index.

The B.E.A.M.A. Index of Activity, quoted by the *Board of Trade Journal*, gives a figure of 99.9 for December (1924=100). This compares with 93.6 in November and 107.3 in December, 1929. For the last quarter of 1930 the level was 97.5 against 111.1 for the corresponding period of 1929.

The amount of electricity generated during the last quarter of 1930 was 207 per cent. of that for 1924.

New Indian Companies.

Among the companies recently formed in India are the Mangalore Electric Supply Co., 14, Old Court House Road, Calcutta, capital 10,00,000 rupees; the Proddatur Power & Light Co., Madras, 5,00,000 rupees; and the Matheran Electric Supply Co., Sardar Mansion, Apollo Street, Fort, Bombay, 2,50,000 rupees.

Henley's in Northern Ireland.

Four or five years ago we illustrated a travelling showroom which W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., was sending on tour in England. Several successful tours were made and interest was aroused, to the benefit of the company's business. Now the van has gone further afield and is at present in Northern Ireland where representative electrical organisations have welcomed it. Among the first to inspect it was the committee of the Belfast Branch of the British Electrical Development Association, the members of which are seen standing by the coach in the accompanying picture. Mr. F. H. Whysall, Belfast city electrical engineer, is in the centre, wearing a light felt hat. On January 26th the Lord Mayor of Belfast, accompanied by members of the Electricity Committee, received the car at the City Hall; on this occasion Mr. Abbott, Electricity Commissioner for Northern Ireland, was also present. Later, the car was invited by Lord Craigavon, the Premier of Northern Ireland, to Stormont Castle. His Lordship showed considerable interest in the exhibits. The car has received a good "Press" during its stay.

The Belfast Branch of E.D.A. and Henley's Demonstration Car.

The South African Mission's Report.

Last year a Trade Mission, under the chairmanship of Lord Kirkley made a study of business conditions in the Union of South Africa and Southern and Northern Rhodesia to discover means by which trade between this country and South Africa could be stimulated and developed. The Mission's conclusions and recommendations are set out in a report published last week by the Department of Overseas Trade (Stationery Office, 1s. net). Adopting an unusual procedure, the Mission comes at once to the essentials by making its comments and conclusions Part I of the report, Part II being a digest of the evidence and considerations upon which they were based. We cannot do more than briefly summarise the matters dealt with. The main prejudicial influence upon our power to compete in the market is said to be "price," but there is also considerable criticism of the methods of United Kingdom manufacturers and exporters. There is an evident preference for British goods, but prices must be competitive and the goods must be adapted to the market. It is complained that British traders do not send out enough skilled men to study the conditions. It is said that where this kind of attention has been paid to the market there has been striking evidence of success. While it is realised that only the larger business houses can send qualified investigators to South Africa, it is recommended that organisations of industries should appoint whole-time investigators to visit overseas markets systematically. Reference is made to the fact that the United Kingdom is the Union's best customer, and the preference accorded to certain classes of Empire products is said to be appreciated. Other matters referred to include the growing possibilities of the "native trade"; freight charges for sea-borne goods; and the Trade Commissioner service. The Mission's recommendations are based on these conclusions; special reference may be made to the paragraph which says: "Efficient service is of vital consequence in connection with the sale of machinery and mechanical appliances." The Mission recommends the establishment of a new Trade Commissioner post for Northern and Southern Rhodesia and Nyasaland and also urges that greater use should be made of the facilities offered by the D.O.T. and its overseas officers. The appendices to the report contain a good deal of useful commercial and general information.

Edinburgh Housing and Building Exhibition.

The stand of Edinburgh Corporation Electricity Department is one of the principal attractions at a Housing and Building Exhibition opened by Lord Provost Whitson in the Waverley Market, Edinburgh, on January 28th. Electric cookers with the latest improvements are demonstrated, while electric fires in new designs are shown. Examples of electric heating either by means of hot water circulation or on the tubular system can be examined. A special feature is an attractively furnished sitting room equipped with all the appropriate electrical appliances.

Exhibition of the Empire's Mineral Resources.

In continuation of the series of special exhibitions designed to draw attention to the Empire's resources of raw materials which have been held at the Imperial Institute, a special exhibition illustrating the mineral resources of the Empire has been arranged. It will be opened by Mr. Amery on February 17th. Mineral specimens, numbering upwards of two thousand, have been specially sent by overseas governments to supplement those already available at the Imperial Institute. Among the exhibits from newly-developed areas, the copper ore of Northern Rhodesia will be fully represented and representative samples of the Bushveld platinum ore and concentrates, Sierra Leone platinum nuggets, and many other recently developed or recently discovered deposits will be included. A handbook entitled "A Survey of the Mineral Position of the British Empire" has been specially written and will be published before the exhibition opens. Besides describing briefly the mineral industries of each of the Empire countries, the handbook discusses the mineral resources of the Empire as a whole in comparison with those of the world and shows by means of statistical tables the present extent of inter-Empire and Empire-World trade in mineral products. Sir Robert Horne is giving an address on the mineral resources of the Empire in the Imperial Institute Kinema at 5.30 p.m. on Thursday, February 19th, and, during the course of the exhibition, a special series of films dealing with Empire mineral industries and mining will be shown in the kinema.

Electricity Propaganda at Nottingham.

During 1930 the progress of Nottingham Corporation electricity undertaking was greater than in any previous year, particularly in the domestic field, an example being the increase in the use of electric cookers. In June, 1929, the consumption of electricity for cooking purposes was negligible, but with the advent of the new electricity showrooms and the hiring scheme, the consumption steadily grew and now over 1,000 homes are using electric cookers. Advertising has played an important part in the year's progress, and the Electricity Department's fleet of lorries (shown in the accompanying illustration) are fitted with two poster boards to accommodate seasonal E.D.A. posters, which are changed from month to month. A recent procession of these vans created considerable interest.

Electrical Advertising at Nottingham.

State Electrical Trading in Australia.

In reply to criticisms that the State Electricity Commission of Victoria had exceeded its proper functions by undertaking the sale of electrical appliances, Mr. Cain, Minister for Electrical Undertakings, recently said that the Commission was fully justified in exercising its rights under the powers conferred by Parliament. Its first duty was to sell electricity.

and anything that helped in that direction was justified. During the past year the following appliances had been sold: 745 ranges, 765 fans, 1,466 grills, 9,294 irons, 4,488 kettles, 2,246 radiators, 837 toasters, and 2,447 vacuum cleaners. These figures showed increases ranging from 30.3 to 331 per cent. as compared with the previous year.

Siemens's New Sheffield Offices.

The branch offices and stores of Siemens Electric Lamps and Supplies, Ltd., at West Bar, Sheffield, having proved inadequate, new premises have been secured at Siemens House, 57/59, West Street, Sheffield, where ample accommodation is

Siemens House, Sheffield.

available to meet the increase in the demand for the company's manufactures. This will enable the company to hold large stocks and thus ensure an efficient delivery service to the trade in the area. The new telephone number is Sheffield 25259 (two lines). An exterior view of the new premises is shown in the accompanying illustration.

Manufacturing in Australia.

In our issue of January 2nd (p. 16) we reviewed a survey of the manufacturing industries of Canada published by Messrs. Erlangers, Ltd. This was the first of a series; the second, dealing with Australia in the same way, has now been received. It is priced at 2s. 6d. The population of the Commonwealth is given as 6,357,000, of which about 50 per cent. is in the six capital cities. The manufacturing industries were responsible for 35.6 per cent. of the total production in 1928-29, the value added in the process of manufacture being £159,759,000, of which £5,646,500 was exported. These industries have shown a steady growth, and at the end of 1928-29 were represented by 2,916 factories employing 450,482 hands, the gross output being valued at £420,445,000, and the net output at £159,759,000, as already stated. Tariff protection has been accorded the Australian manufacturing industries for many years and the survey makes a study of the course of this policy, culminating in the heavy additions to duties which were imposed last year. As in the previous publication, industries are dealt with group by group and clear analytical and comparative diagrams are provided. The metal works, machinery, &c., group is said to have comprised 2,680 establishments in 1928-29. These employed about 99,000 hands and had a gross output of the value of £83,348,000. There were 267 electrical apparatus factories, employing 5,921 hands, and the value of their output is given as £3,406,000. In 1929 imports of electrical supplies into Australia were valued at £4,810,000, of which the United Kingdom was credited with £2,509,500, the United States with £1,396,000 and the Netherlands with £464,000. It is noted that the importation of electric heating apparatus, wireless receiving sets, batteries (including dry cells), accumulators and electric irons has been prohibited except under licence, while other items have been subjected to heavily-increased duties. This will materially alter the import figures. During the current year, it is stated, the Australian Electrical Manufacturing Co., Ltd., will be in full operation. This concern is a combination of the interests of the Australian General Electric Co., Ltd., Ferguson, Pailin, Ltd., and Metropolitan-Vickers (Australia) Pty., Ltd. It is considered that the electrical manufacturing industry will make great strides now that the most important manufacturing concerns have decided to pool their resources and knowledge. A section devoted to "Heat, Light and Power" shows that Australia has 326 electricity undertakings with a gross output valued at £9,105,000, while there are 114 gasworks with an output of the value of £7,584,000. Of the 1,679,314 h.p. of power used in Australia 537,670 h.p. is electrical.

Australian Business Changes Hands.

The business of Messrs. Weymouths, Ltd., transformer manufacturers and general electrical engineers, of Richmond, Melbourne, has been sold to the Australian Electrical Manufacturing Co., Ltd., which is referred to above. In future Weymouths will be known as the Weymouth Works of the Australian Electrical Manufacturing Co., Ltd., and Mr. H. H. Weymouth and Mr. H. Weymouth will continue the management. The company was a subsidiary of Standard-Waygood, Ltd., of Sydney. The capital, at September 30th, 1929, was £26,500, compared with £52,500 at June, 1928, the sum of £8,500 having been written off and £17,500 returned to shareholders.

Trade Announcements.

The AEROGRAPH CO., LTD., is erecting a large up-to-date factory at Lower Sydenham, S.E.26, which will be put into commission early in March. The head office of the company will remain at 43, Holborn Viaduct, E.C.1.

Messrs. E. DAWSON & Co., 10, Gray's Inn Road, W.C.1, have been appointed sole agents for Dr. Alb. Lessing, Nürnburg (carbon brushes).

Owing to the expansion of business in other departments, Messrs. S. G. BROWN, LTD., have transferred (as from February 2nd) the sole distribution and sale of their wireless and gramophone products throughout the world to RADIO & ALLIED SALES, LTD., Park Royal Road, North Acton, W.3. (Telephone: Willesden 6321-3), whose registration is recorded in the New Companies section of this issue.

Germany's Electrical Imports and Exports.

The imports of electrical machinery and apparatus into Germany during the eleven months ended with November last attained a value of £1,975,750, as compared with £2,539,150 in the corresponding period of 1929. There was also a decline in the exports of similar material from Germany during the period under review from £26,396,350 to £26,058,950.

Lighting of Southport Co-operative Stores.

The accompanying illustration shows the interior of a portion of the Southport Co-operative Stores' new premises. The lighting fittings used are G.E.C. "Britalux" totally enclosed lighting pendants, enclosing 200-watt Osram lamps. As will

Co-operative Store Illumination at Southport.

be seen the uniformity of this lighting is most marked, while the intensity is also good. The contractors for the electrical work were Messrs. F. W. Smith & Co., Houghton Street, Southport.

Price Reductions.

Messrs. BELLING & Co. announce reductions in the prices of their "Empire" and "Projector" electric fires. A circular containing particulars of the reductions is being sent to the trade.

Patent Restoration Application.

Application has been made by Ralph Henry Winter and Harry Charles Daly for the restoration of the patent granted to them for an invention entitled "Improvements in or relating to grid leaks and condensers for use in connection with radio apparatus," numbered 261,864, and bearing the date September 4th, 1925. Any notice of opposition to the restoration should be made by March 23rd at the Patent Office, 25, Southampton Buildings, W.C.2.

Chilean Duty on Radio Sets.

According to a *Reuter's Trade Service* message from Santiago de Chile, radio receiving sets, formerly paying an import duty of 0.30 peso per gross kg. will now pay 7 pesos per kg. for assembled or mounted sets, and 5 pesos per kg. for unmounted sets. Sound-reproducing equipment for theatres will pay 5 pesos per kg.

A Market for Small Automatic Electric Refrigerators.

A memorandum on the trade in British Guiana, indicating a market for small electric refrigerators, has been prepared, based on notes from H.M. Trade Commissioner in the British West Indies. Firms interested in the export of small refrigerators desirous of receiving a copy of this memorandum should communicate with the Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. Reference number A.X. 10759 should be quoted.

Quoting for Polish Business.

A confidential memorandum on methods of quoting and terms of payment prevailing in relation to business with Poland, prepared by the Commercial Secretary at Warsaw, has been received and issued by the Department of Overseas Trade to firms whose names are on its Special Register. British firms who desire to obtain a copy of the memorandum and particulars of the Special Register service should apply to the Department. Reference No. C.X. 3448 should be quoted.

The Leipzig Spring Fair.

The London office of the organisers of this Fair, which is to be held from March 1st to 11th, sends us particulars of the facilities and services available to intending visitors. Official vouchers, catalogues and accommodation can be obtained through the office at 1, Gower Street, W.C.1.

The Business Research Association.

The Business Research and Management Association has decided to accept members for the second half of the present session at a subscription of a guinea instead of the usual two guineas for a whole session. Subjects to be reviewed at meetings include market research in the Empire, and several important aspects of budgetary control, and members are encouraged to open discussions on any problems which they have come across personally in the course of business. All meetings are held at Anderton's Hotel, Fleet Street, at 7 p.m., and inquiries should be addressed to the secretary, Mr. H. A. Haylett, 27, Chancery Lane, W.C.2.

Committee "D."

Speaking at the recent annual dinner of the West Yorkshire branch of the E.C.A., Mr. A. G. Beaver foreshadowed a report from Committee "D" in the very near future. This Committee was created at a meeting of the Electricity (Supply) Act Conference in May, 1927, after unanimous agreement had been reached by that body on the terms of Clause 48 of the 1926 Act. The Committee was charged with the duty of reporting to that Conference on a fair-trading agreement submitted to it by the Electrical Contractors' Association of Scotland. That work shortly reached the stage of agreement in principle as to the need for a common-form agreement for both Scotland and England, which naturally involved the settling of terms generally as between all classes of buyers and sellers in the trade. Committee "D" is thus working on parallel lines with the Electric Fittings Statutory Committee set up under Clause 48 of the 1926 Act.

Proposed Marking of Insulating Tape.

The Board of Trade gives notice that it has referred to the Standing Committee under the Merchandise Marks Act, 1926, an application for an Order-in-Council to require the marking with an indication of origin of imported adhesive insulating tape for electrical purposes. Representatives of any interests substantially affected by the application who desire to be heard in opposition at the public inquiry which will be held later by the Committee should communicate with the Secretariy, Mr. E. W. Reardon, at the Board of Trade Offices, Great George Street, S.W.1, not later than February 28th.

The Buenos Aires Exhibition.

The plans for the British Empire Trade Exhibition made fifteen months ago, says *Reuter's* Buenos Aires Correspondent, were based on expectations of a show of not more than, say, 150 to 200 exhibitors, occupying from 100,000 to 150,000 sq. ft., but with a reasonable increase also in view. Actually it has been found necessary to add to the buildings originally under consideration the Museum and three entirely new buildings, and there is now a total net floor space approaching 300,000 sq. ft. as well as about 25,000 sq. ft. of "open air" exhibits. Everything is being done to make the Exhibition complete in every way. With regard to lighting, a scheme has been prepared and is now being adapted to local conditions with the aid of the leading British electrical firms established in Argentina. It will combine some of the most modern floodlighting with quaint and colourful effects in the old-English frontages of the buildings.

New Catalogues and Lists.

The BRITISH ELECTRIC RESISTANCE CO., LTD., Ohmic Works, Ponders End, Middlesex.—List 400, giving a full description, illustrations and prices of "Berco" rheostats, vitreous enamelled resistance units, resistance wires, &c.

The MARCONIPHONE CO., LTD., 210-212, Tottenham Court Road, London, W.1.—The third of the series of "Marconi" valve posters and a new chart showing the recommended "Marconi" valves for a very wide range of receivers and circuits.

The ANGLO-SWISS ELECTRICAL CO., LTD., 15, Victoria Street, Westminster, London, S.W.1.—An illustrated index describing electrical measuring instruments, &c., manufactured by Messrs. Trüb, Täuber & Co., of Zurich.

REDFERN'S RUBBER WORKS, LTD., Hyde, near Manchester.—An illustrated brochure relating to ebonite pipes, bends, taps, pumps, linings, coverings, &c., for use in chemical and other trades handling corrosive acids.

HOPKINSONS, LTD., Huddersfield.—An interesting publication (No. 3,110) giving a detailed description of "Hopkinson's" mine signal indicators.

HAILWOOD & ACKROYD, LTD., Morley, near Leeds.—Folios H.W.31/1 and H.W.50/1 relating to "Hailglassware" globes, wall brackets, &c., "Hailware," "Cubolite" and other fittings.

The SKEFKO BALL BEARING CO., LTD., Luton, Beds.—A folder referring to "S.K.F." ball-bearing lineshaft equipment.

BLACKSTONE & CO., LTD., Stamford, Lincs.—Publication No. 468, describing the latest types of the company's "Unchokeable" pump.

MARCONI'S WIRELESS TELEGRAPH CO., LTD., Marconi House, Strand, London, W.C.2.—Leaflets describing and illustrating three new Marconi receivers and a short-wave telegraph-telephone transmitter.

DAVID BROWN & SONS (HUDDERSFIELD), LTD., Park Works, Lockwood, Huddersfield.—Technical Data Sheet No. 1,011, giving particulars of various types of speed increasing gears for deep-well and surface pumps.

SIEMENS BROTHERS & CO., LTD., Woolwich, London, S.E.18.—Catalogue 170, section II, dealing with "Siemens" joint-box compounds.

FEED WATER SPECIALISTS CO., St. Paul's Square, Liverpool.—Technical Publication No. 29, containing references to the superheater installation of the largest boilers in the world, boiler feed water treatment, &c.

The MULLARD WIRELESS SERVICE CO., LTD., Mullard House, Charing Cross Road, London, W.C.2.—A revised edition of the poster "Which Valves for What," giving particulars of the appropriate "Mullard" valves for use in various modern receivers.

A. F. BULGIN & CO., LTD., 9, 10 and 11, Cursitor Street, Chancery Lane, London, E.C.4.—A 60-page catalogue of "Bulgin" radio products. Illustrated and priced.

DYNAMEG, LTD., 41, Oriel Road, Bootle, Liverpool.—An illustrated booklet giving details of the "Dynameg" fault-finding and testing set.

CHARLES E. DOUGLAS & CO., LTD., 213-8, Cecil Chambers, 76, Strand, London, W.C.2.—The English edition of Messrs. Erste Brünner's pamphlet describing and illustrating their steam turbines.

Bankruptcy Proceedings.

D. C. LUEN, wireless dealer, 78, High Street, Barry.—Receiving order made January 22nd on debtor's own petition. First meeting February 6th at 34, Park Place, Cardiff. Public examination March 5th at the Law Courts, Cathays Park, Cardiff.

W. P. BARNELL, electrical engineer, 25a, Sheep Street, Northampton.—First meeting held February 3rd at the Official Receiver's office, 6, The Parade, Northampton. Public examination February 6th, at the County Hall, Northampton.

A. C. E. APPLIN (Applin & Burt), electrical engineer, 110, St. Mary's Road, Southampton.—First meeting held February 5th at the Official Receiver's office, Midland Bank Chambers, High Street, Southampton. Public examination February 18th at the Court House, Castle Square, Southampton.

J. G. RICHIE, electric lamp dealer, 54, Woodsley Road, Leeds.—Application for discharge to be heard on February 25th at the County Court House, Albion Place, Leeds.

J. H. JACKSON, electrical engineer, The Dock House, Winsford.—Trustee, Mr. C. J. Pyke, Official Receiver, 12, Lonsdale Street, Stoke-on-Trent, released January 16th.

Company Liquidations.

W. R. BOTTOMLEY & CO., LTD., electrical engineers, Marsh, Huddersfield.—At the recent statutory meeting of creditors, a statement of affairs was presented, showing ranking liabilities of £1,512, of which £294 was due to the trade, and net assets

of £175, leaving a deficiency of £1,337. The issued capital was £1,100. The company was registered in July, 1929, taking over an existing business. Up to March 31st, 1930, the turnover was £1,100, with a gross profit of £72, but there was a net loss of £696. Since April 1st of last year the turnover had been £643. Mr. W. R. Bottomley was a creditor for £1,162 in respect of money advanced from time to time. He intimated that he was willing to reduce his claim to £500. The creditors decided to confirm the voluntary liquidation of the company, with Mr. F. White, Huddersfield, as liquidator, with a committee. The following are creditors :—

	£		£
Crowther, Alfred, (Huddersfield), Ltd.	35	Electric Lamp Factors, Ltd.	27
Electrical Components, Ltd.	65	Falk, Stadelmann & Co., Ltd.	29
Sloan Electrical Co., Ltd.	31	Magee, James, & Co. ...	53

MALAY & EASTERN POWER DEVELOPMENT CO., LTD.—Winding up voluntarily. Liquidator, Mr. D. C. Brook, 3, Central Buildings, Westminster, S.W.

BURAVOX, LTD.—Winding up voluntarily. Liquidator, Mr. F. Wilcock, Salisbury House, Finsbury Circus, E.C. Particulars of claims to the liquidator by March 31st.

DULVERTON ELECTRIC LIGHTING CO., LTD.—A meeting of members will be held on March 5th at the office of the company in Dulverton, to receive an account of the winding up of the company by the liquidator, Mr. E. G. C. Chapman.

F. W. APPLEYARD & SON, LTD.—Particulars of claims by March 3rd to the liquidator, Mr. T. R. G. Rowland, 3, Scarborough Street, West Hartlepool.

Prices of Raw Materials.

The following prices are only general, and they may vary according to quantities and other circumstances :—

	CHEMICALS, &c.	Price Feb. 3rd.	Fortnight's inc. or dec.
a	Acid, Oxalic... ... ... per lb.	5¾d.	...
a	Ammoniac, Sal ... ... per ton.	£60	...
a	Ammonia, Muriate (large crystal) ,,	£52	...
a	Bisulphide of Carbon ... ... ,,	...	...
a	Borax ... ... ,,	£17	...
a	Copper Sulphate ... ... ,,	£25 10s.	...
a	Potash, Chlorate ... ... per lb.	3d. to 4d.	...
a	,, Perchlorate ... ... ,,	5½d.	...
a	Shellac ... ... per cwt.	£13 10s.	...
a	Sulphur, Commercial ... ... ,,	£11	...
a	,, Roll ... ... ,,	£11	...
a	Soda, Chlorate ... ... per lb.	3d.	...
a	,, Crystals ... ... per ton.	£5 to £5 5s.	...
a	Sodium Bichromate, casks ... per lb.	3½d.	...
	METALS, &c.		
b	Aluminium, Ingots ... ... per ton.	£85 to £90	...
b	,, Wire ... ... per lb.	1/1 to 1/9	...
b	,, Sheet	1/1 to 2/9	...
b	Babbitts Metal and Anti-friction Metals—		
	Grade I ... ... per ton net.	£111	£3 dec.
	Grade II ... ... ,, ,,	£81	£2 dec.
	Grade III ... ... ,, ,,	£50	...
c	Brass (rolled metal 2" to 12" basis) per lb.	7¾d.	½d. dec.
c	,, Tubes (Solid drawn) ... ,,	9¾d. to 10d.	½d. dec.
c	,, Wire, basis ... ... ,,	8½d.	½d. dec.
c	Copper Tubes (solid drawn) ... ,,	11d.	½d. dec.
g	,, Bars (best selected) ... per ton.	£75	...
g	,, Sheet ... ... ,,	£75	...
g	,, Rod ... ... ,,	£75	...
d	,, (Electrolytic) Bars ... ,,	£49 17s. 6d.	...
d	,, ,, Sheets... ... ,,	£143 10s.	...
d	,, ,, Wire Rods ... ,,	£59 17s. 6d.	...
d	,, ,, H.C. Wire ... per lb.	7¼d.	½d. dec.
f	Ebonite Rod... ... ... ,,	2/3 to 2/6	...
f	,, Sheet ... ... ,,	2/3 to 2/6	...
n	German Silver Wire ... ... ,,	2/1	...
h	Gutta-percha, fine... ... ... ,,	nom.	...
h	India-rubber, Para fine ... ... ,,	5½d.	½d. dec.
i	Iron, Pig (Cleveland No. 3.) ... per ton.	58/6	5s. dec.
l	,, Wire, galve. No. 8, P.O. qual. ,,	£20	...
g	Lead, English pig... ... ... ,,	£14 5s.	£1 dec.
g	Mercury ... ... per bot.	£22 7s. 6d. to £22 10s.	...
e	Mica (in original cases) small ... per lb.	6d. to 3/-	...
e	,, ,, medium ,,	4/- to 8/-	...
e	,, ,, large ... ,,	10/- to 20/- & up	...
p	Phosphor Bronze, plain castings ,,	1/1½d.	...
p	,, ,, drawn bars & rods ,,	1/0½d.	...
p	,, ,, rolled strip & sheet ,,	1/1d.	...
p	,, ,, wire ... ... ,,	1/1d.	...
o	Platinum ... ... per oz.	£6 15s.	...
d	Silicium Bronze Wire ... ... per lb.	9¼d.	...
r	Steel, magnet, in bars ... ... ,,	7¾d.	...
g	Tin, Block (English) ... ... per ton.	£113 15s. to £114 15s.	£2 15s. dec.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	2/11d.	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p C. Clifford & Son, Ltd.
W. F. Dennis & Co

Reporting on January 31st, Messrs. James Forster & Co stated that the lead market declined further early last week, but there was a steadier tone on Wednesday. A further decline occurred on Thursday, the market closing unchanged with little business passing. A small demand has been met with from consumers, mainly for early delivery. Supplies continue to be abundant. Similar conditions prevail on the Continent and in the U.S.A., and until this state of affairs alters it seems likely that a lower level will yet be seen.

Dissolution of Partnership.

MARYLEBONE ELECTRIC INSTALLATION & REPAIRS SERVICE, consulting, contracting and general electrical engineers, 86, George Street, Baker Street, W.—The partnership between Mr. E. L. F. Reeves and Mr. R. H. L. Goring has been dissolved. Mr. Goring will attend to debts.

Winding-up Petition.

AEONIC RADIO, LTD.—A petition for the winding up of this company has been presented to the High Court by the Dubilier Condenser Co. (1925), Ltd., and Messrs. A. T. Buckingham and H. W. Evemy. The petition will be heard in London on February 9th.

Ideal Home Exhibition.

We have received an advance brochure, illustrated in colour, giving particulars of the principal features of the Ideal Home Exhibition which will be held at Olympia from April 7th to May 2nd.

Lighting and Power Notes.

Accrington.—LOAN.—The Corporation is applying for sanction to a loan of £13,344, excess expenditure on account of plant extensions, cooling tower, &c.

Argentina.—HYDRO-ELECTRIC DEVELOPMENT.—The Minister of Public Works has received from the engineering staff charged with the study of hydraulic power and the cost of transmitting electric power to the capital and nearby towns, an encouraging report, which is expected to lead to important developments. Among the sources reported upon are the Apipe Rapids and the Salto Grande and Iguasú Falls. During 1930 the installed capacity of generating equipment supplying this section (Federal City and districts) exceeded 400,000 kW, and it is estimated that the growth of demand for power will render substantial additions necessary before long. The potential power from sources within an area of 32,000 sq. km. is conservatively estimated at 2,000,000 h.p., but other important unexploited sources exist in the Rio Negro Territory, particularly in the Cordillera region between San Martin de Los Andes and Colonia 16-de-Octubre. At Buenos Aires the consumption of electricity has steadily increased, and now exceeds 550,000,000 kWh per annum, an increase of 138,000,000 kWh since 1925. Public consumption absorbs 45,000,000, lighting 160,000,000, and power and traction 345,000,000 kWh.—*Reuter's Trade Service* (Buenos Aires).

Ashford.—YEAR'S WORKING.—The accounts of the Urban District Council Electricity Department (engineer: Mr. Herbert Wilson) for the year ended March 31st last show a total revenue of £26,029 and a working expenditure of £14,777, leaving a gross profit of £11,252. The corresponding figures for the previous year were: income, £18,861; working expenses, £10,513; gross profit, £8,348. To the gross profit was added income from other sources making a total of £13,229 available. After providing for interest on loans and sinking fund contributions, there was a net profit of £1,785, which compares with £2,131 in the previous year. Sales of electricity increased from 2,624,734 to 3,472,694 kWh and the maximum supply demanded from 1,270 to 1,760 kW. The average price obtained per kWh rose from 1.725d. to 1.798d.

Australia.—TASMANIA.—The first report of the Hydro-Electric Commission, which was formed last year to take over control of the State hydro-electric works, shows that the total revenue of the Hydro-Electric Department for the year ended June 30th last amounted to £345,752, as compared with £315,621 in the preceding year. The working expenditure increased from £52,245 to £61,218, leaving a gross profit of £284,534 (£263,376). After making provision for capital and other charges there was a net surplus of £27,719, which compares with £23,726 in 1928-29. Capital expenditure during the year amounted to £78,140, bringing the total now spent on the undertaking to £3,670,675. The total quantity of electrical energy generated increased from 314,300,704 to 333,903,500 kWh. Various developments have been carried out during the year, including the extension of mains in the municipalities of Sorell and Richmond, and a new transmission line from Woodbridge to Middleton and Gordon. The extension of the line from Wynyard to Smithton and Stanley is also to be proceeded with, and investigations have been made into the possibilities of supplying part of the Beaconsfield municipality, at any rate as far as Rosevears. The increase in the use of electricity in rural areas has shown considerable progress and 1,139 farms are now electrically equipped.

Barnstaple.—LOANS SANCTIONED.—The Town Council has received sanction to loans of £1,500 for mains and services, and £500 for meters.

Bury (Lancs.).—CHANGE-OVER SCHEME.—The Town Council has received from the borough electrical engineer a report that the plant at the Rochdale Road power station is overloaded. A proposal for changing over the system to a.c. was

agreed to, and the engineer is to interview the Electricity Commissioners with a view to expediting the scheme, and to put the work in hand as an unemployment relief scheme. The estimated cost is £20,000, of which £10,000 is for mains, with an equal sum for motors, &c.

Cheltenham.—MAINS EXTENSIONS.—The Corporation Electricity Committee has asked the borough electrical engineer to prepare alternative estimates for the extension of mains to Uckington and Arle.

China.—ELECTRICAL DEVELOPMENT.—Under the auspices of the National Reconstruction Commission of the Chinese Government, extensive developments in connection with electricity supply throughout China are contemplated. It is proposed to establish power distribution systems all over the country which will be divided into districts controlled and supplied by a number of efficient central stations and h.p. transmission lines. All small, uneconomical plants are to be eliminated and replaced by sub-stations fed by the proposed network. A start is being made in Kiangsu and Chekiang where the Nanking and Wusih plants will be utilised as the first units of the Kiangsu power system, while the plant at Hangchow will serve as the central unit for the province of Chekiang. The plans for Nanking provide for a new 15 000-kW plant with an ultimate capacity of 60,000 kW, to be completed in two years, while for Hangchow the first 15,000-kW unit has been ordered for a plant designed for a capacity of 60,000 kW. China has now 575 electricity undertakings (aggregating 527,240 kW), of which 17 are owned by the Government. Most of the enterprises being private and uneconomically managed, the Reconstruction Commission is authorised to regulate and supervise them.

Continental.—ITALY.—La Società Forze Idrauliche Alto Cadora, of Belluno, has recently secured a concession to establish a hydro-electric power station to utilise the water of the Rivers Piave and Ausicis near Auronzo. It is estimated that about 50,000 h.p. is available. A concession has also been granted to the Societa Elettrica Alto Adige, of Novara, to establish plants to utilise the power of the Rivers Anza, Olochia, and Posenza, near Appomovelli. In this case, a total of about 12,520 h.p. is estimated to be available.

GREECE.—According to a recent return there were 225 central electric power stations in operation in Greece at the end of March, 1929. Since then the number has been raised to 275, and it is stated that there is now hardly a town of importance in the country which has not an electricity supply. The majority of the stations in Greece, are, however, of small capacity, there being only three—at Athens, Achaia, and Salonika—of over 2,000 h.p. Over 90 per cent. of the plants in the country are operated by internal-combustion engines.

POLAND.—The Warsaw correspondent of the *Financial News* says that the electrification of Poland is on a level which corresponds with that of other more advanced countries—for example, Switzerland—25 years ago. In 1929 the average consumption per head of population amounted to 100 kWh, whereas the figure for Switzerland was 1,300 kWh. Some 160 stations, with a total capacity of 1,200,000 kW, are producing 95 per cent. of the country's electricity supply. Most of the power stations are run on coal, there being only two large water plants in existence. According to the calculation of the Polish Power Committee, the demand for electrical energy will have increased to 10,790,000 kW by 1965 and Zl.120,000,000 will be invested every year in stations and h.p. lines. The capital necessary for investments of all other kinds connected with the distribution and consumption of the energy will certainly amount to another Zl.120,000,000, making a total of Zl.240,000,000 a year, of which only part can be provided for by internal capitalisation.

Denny (Stirlingshire).—MAINS EXTENSIONS.—The Town Council has remitted to the Electric Lighting Committee consideration of an extension of the electric lighting cables.

Dover.—PURCHASE OFFER DECLINED.—The Town Council has decided to decline an offer by the South-East Kent Electric Power Co., Ltd., to purchase the electricity undertaking for a sum of £235,000. A clause in the recommendation of the Council in committee which provided that the undertaking should not be sold was deleted, thus leaving it open for further offers to be made. By the casting vote of the Mayor it was decided to re-open negotiations with the Central Electricity Board for a bulk supply.

Dunfermline (Fife).—FLOODLIGHTING OF A PARK.—The Carnegie Trustees are to obtain a report by a lighting expert regarding floodlighting at Pittencrieff Park.

Eastbourne.—LOANS.—The Corporation Electricity Committee is applying for sanction to loans of £19,023, for electricity extensions, reinforcement of mains, and construction of new sub-stations; and £4,625, for the construction of three sub-stations, at the junction of Lewes and Enys Roads, at the junction of Enys and St. Ann's Road, and at Lottbridge Drive.

Irlam.—EXTENSIONS.—The Urban District Council has received sanction to the borrowing of £103,000 in connection with a scheme for the extension of the electricity supply.

Kingston-on-Thames.—LOAN.—The Town Council has applied for sanction to a loan of £4,350 for transformers required to maintain a satisfactory pressure in the Kingston Hill area.

ASSISTED WIRING.—The Electricity Committee has decided to adopt a system of wiring to be charged for at the rate of £1 per point, the cost to be recovered through prepayment meters by an additional charge of 2d. per kWh. With the present rate of 5d. per kWh, plus 1½d. per kWh for rent of meter, the charge under the assisted wiring scheme will be 8½d. per kWh.

London.—HAMMERSMITH.—The Borough Council Electricity Committee has decided to require deposits from consumers taking supplies of electricity for domestic purposes under tariff "D," on the same conditions as apply to other consumers.

BATTERSEA.—The Borough Council Electricity Committee has obtained sanction to loans of £48,000 for mains and services, and £2,037 for plant. The Committee is to provide electricity services at 89 premises, at a cost of £786, and replace with armoured cable, old vulcanised-bitumen distributors, at a cost of £2,593.

Lytham St. Anne's.—BULK SUPPLY.—The Town Council has sanctioned the borrowing of £4,252 for switchgear, &c., in connection with the bulk supply from Preston Corporation.

Maidstone.—INCREASED DEMAND FOR D.C.—In order to meet the increased demand for d.c. in the Tovil area, the Electricity Committee proposes to provide additional plant, including a mercury arc rectifier, switchgear, &c., at an estimated cost of £3,200.

LOANS SANCTIONED.—The Town Council has received sanction to loans for electricity purposes amounting to £35,000, of which £25,000 is for mains and services.

Middlesex.—ELECTRIC COOKING AT SANATORIUM.—The County Council has agreed to the installation of electric cooking apparatus in the new buildings now being erected for the nursing and domestic staff at Harefield Sanatorium. The cost is estimated at £1,110.

Reigate.—BULK SUPPLY.—The Town Council has applied for sanction to a loan of £2,000 for modifications to the h.p. switchboard in connection with the new bulk supply from the Central Electricity Board.

Ripon.—PROPOSED EXTENSION OF SUPPLY.—A canvass is to be taken by the Corporation Electricity Committee of the anticipated requirements of electricity in the Wath, Melmerby, Kirkby Malzeard, and Grewelthorpe districts.

Scarborough.—THE LIGHTING OF COUNCIL HOUSES.—The Town Council has decided that tenants of Corporation houses who have had gas lighting or other fittings without the consent of the Council must have these fittings removed and any alterations made good, or they must leave the houses. The Council considers that the lighting needs of the houses are adequately met by the electrical service supplied by the Corporation.

Stoke-on-Trent.—EXTENSIONS.—The Corporation Electricity Committee is to undertake the following extension schemes:—Mains extensions to supply houses at Meir, £3,200; mains and transformer kiosk to supply 266 houses on Lightwood Chase estate, Longton, £3,700; new e.h.p. feeder from the Hanley Sub-Works, *via* Hartshill, to Basford, £10,500; mains to supply houses in Bucknall New Road, Hanley, £900.

NEW SUB-STATION.—The Electricity Committee has decided to invite tenders for the erection of a sub-station in Hanley Road, Sneyd Green, and application is to be made to borrow £2,500, the estimated cost of the building, equipment, and cables.

LOANS.—Sanction has been received to the following loans:—£10,000 for alteration and replacement of consumers' apparatus in connection with the change-over scheme; £2,200, for works in connection with an additional supply of electricity to the Trent Vale Brick & Tile Co., Ltd.; and £950, in connection with the proposed sub-station building in Belgrave Road, Dresden.

SUPPLY TO MILTON.—Application is to be made to the Unemployment Grants Committee for a grant in connection with the provision of electricity to Milton at an estimated cost of £6,000.

APPARATUS FOR DOMESTIC SCIENCE CENTRES.—The Electricity Committee has decided that the necessary cookers and other equipment shall be provided and mains extended for supply to the domestic science centres in course of erection in Longton and Fenton, at a cost of £980.

Twickenham.—STREET LIGHTING.—The Borough Council has approved a recommendation by the Lighting and Pleasure Grounds Committee for the conversion of the whole of the lighting of the town from gas to electricity.

York.—LOANS.—The Corporation Electricity Committee recommends that application should be made for sanction to loans of £32,297 for further change-over schemes, and £5,000 for transformers and kiosks.

OVERHEAD LINES.—The Electricity Committee has decided to erect overhead lines for the transmission of power to Moor Monckton.

Tramway and Railway Notes.

Australia.—PROPOSED TRAMWAY EXTENSION.—The Victoria Railways Standing Committee reports in favour of extending the East Kew electric tramway along the Doncaster Road, in the suburbs of Melbourne, at a cost of £62,000.

NEW SOUTH WALES.—The annual report of the New South Wales Railway Commissioners shows that the total revenue of the tramway system amounted to £3,903,470 for the year ended June 30th last. The working expenses totalled £3,625,564, leaving a balance of £277,906. After allowing for interest and other charges there was a loss on the year of £385,244.

Burnley.—SHORT-TIME WORKING.—The Corporation is introducing short-time working for tramways and omnibuses as an indirect consequence of the cotton lockout.

Continental.—BELGIUM.—A special report has recently been presented to the directors of the Belgian State Railway Exploitation Co., on the subject of the electrification of the Brussels-Arlon, Brussels-Antwerp, and Marloie-Liège sections of the system. The engineer responsible for the report estimates that the electrification work would cost approximately £1,629,000, from which can be deducted £1,700,000 for the renewal of steam locomotives which will be required if the electrification work is not proceeded with.

SWITZERLAND.—Work has recently been completed on the electrification of the steam tramway running between St. Gall, Gais and Appenzell. The 1,500-V d.c. system has been adopted.

GERMANY.—The Berlin correspondent of the *Financial Times* says that the Council of the Reichsbahn (German State Railway Company) has decided to support the German Government's plan of providing work for the unemployed by proceeding with the electrification of certain stretches of the permanent way. For this purpose a credit of Rm.50,000,000 (£2,500,000) is to be granted by a group of leading German electrical companies, including the A.E.G., Siemens and Halske and Bergmann, of Berlin, and Brown, Boveri & Co., of Mannheim. The German Government has declared its willingness to pay the interest on this credit for the first few years. It is stated that the section of the line between Augsburg and Stuttgart, passing over the Geislinger Steige, will be electrified.

The final section of the mountain electric cable railway on the Zugspitz (9,730 ft.) was officially opened a few days ago.

Derby.—TRAMWAY ABANDONMENT.—The Minister of Transport has sanctioned the abandonment of the tramways on the Market Place-Nottingham Road route. A railless-car service is to be substituted.

Great Western Railway.—TRAIN LIGHTING.—In a review of the progress of the Great Western Railway during the past year it is mentioned that all new railway coaches are fitted with electric lighting and that a number of old vehicles have been converted from gas to electricity. There are now 3,119 out of a total of 6,828 coaches lighted by electricity.

Hull.—DECLINE IN TRAMWAY RECEIPTS.—A probable deficit of over £2,000 instead of an anticipated surplus of £14,000 was disclosed in estimates submitted recently to the Corporation Tramways Committee. The decline in the tramway receipts was stated to be due very largely to 'bus competition both by the Corporation's and private 'bus services. The Committee is to take preliminary steps to obtain powers to run 'bus services outside the city.

Lancashire.—RAILLESS-CAR OBJECTIONS.—The County Council Parliamentary Committee recommends that objection should be made to the proposed Bills of the Preston and Bacup Corporations giving them powers to operate railless cars on various routes.

Liverpool.—TRAMWAY ABANDONMENT.—The tramway services on the Seaforth and Pierhead (*via* Knowsley) and the Mather Avenue and Pierhead (*via* Wavertree) routes were discontinued last Saturday.

London.—A NEW SUBWAY.—The *Daily Telegraph* states that a scheme for constructing a pedestrian subway to connect the Underground railway station at the Monument with the Bank station of the City and South London Railway has been decided on in collaboration between the railway interests concerned.

Royal Commission on Transport.—RAILWAY COMPANIES' REPLY TO CRITICISMS.—The criticisms of the Royal Commission on Transport are replied to by the railway companies in the *Railway Newsletter*. The companies emphasise the fact that the cost of electrifying all their suburban lines would far exceed the £9,000,000 invested in road transport. If they had expended that sum on the electrification of their suburban lines, even in London alone, in lieu of their investments in road transport, not only would it have been wholly insufficient to carry out an efficient and comprehensive scheme, but they would not have secured that measure of co-ordination of road and rail traffic to which the Commissioners attach considerable importance.

Spenborough.—TRAMWAY ABANDONMENT OPPOSED.—The Urban District Council has decided to oppose the Parliamentary Bill by which the Yorkshire (Woollen District) Electric Tramways, Ltd., seeks powers to abandon the tramways in the district.

Telegraph and Telephone Notes.

Africa.—AIRCRAFT RADIO STATIONS.—Sixteen new wireless stations will be established in connection with the Cairo-Cape airway, the first section of which is to be inaugurated on February 28th. From Croydon to Alexandria the aeroplanes will be in communication with existing international stations, but thereafter a chain of telegraph stations between Cairo and Capetown will eventually enable passengers to transmit private telegrams to any part of the world. On the African section of the route wireless direction-finding equipment will be used for navigating purposes. Telegraphy and not telephony will be mainly used, because of its considerably greater relative range.

Anglo-Canadian Telephony.—DIRECT ROUTE.—Sitting in an armchair in his home at Oxhey, Herts., England, at 1.45 a.m. on January 30th, Mr. C. C. Paterson, president of the Institution of Electrical Engineers, delivered a "lantern" lecture to members of the Engineering Institute of Canada, who were assembled in their lecture theatre in Montreal, 3,000 miles away. The lecture was transmitted by direct radio-telephony; the circuit was from the Post Office Rugby station and the Bodmin beam station of Imperial and International Communications, Ltd., to the Canadian Marconi Company's station at Yamachiche; landlines were used between Mr. Paterson's home and Bodmin and Rugby, as well as between Yamachiche and Montreal. For the experiment lantern slides, which had been sent to Canada in advance, were shown on the screen at the appropriate moments. Mr. Paterson's subject was electric power supply in Great Britain, with special reference to the national organisation and the grid.

Canada.—TELEGRAPH MERGER PLAN.—Negotiations between Sir Basil Blackett, chairman of Imperial and International Communications, Ltd., and the Canadian Telegraph Companies relating to the establishment of a common carrier in the Dominion for external cable business are being continued at Montreal. Sir Basil has conferred with Mr. E. W. Beatty, president of the Canadian Pacific Railway, and has had interviews with officials of the Canadian National Railway and the Canadian Marconi Company. Sir Basil's visit to Montreal followed a conference which he had with the Prime Minister, Mr. Bennett, in Ottawa. During his recent visit to Bermuda, Sir Basil arranged a wireless telephone system to connect the island with New York and Montreal.—*Reuter* (Montreal).

On his departure for England (he is sailing on the s.s. *Majestic*) Sir Basil stated, according to *The Times*, that there was every hope of a satisfactory outcome of the merger negotiations, and closer co-operation had been arranged with the Canadian Pacific Railway in developing Imperial cable services across the Atlantic and Pacific Oceans.

The Dominion Railway Board, which regulates telegraph and telephone tolls, is to be re-organised in consequence of the resignations of Mr. H. M. A. McKeown, chairman, and Lieut.-Col. Thomas Vien, vice-chairman.

TELEPHONY.—According to a report of the Dominion Bureau of Statistics, the estimated number of conversations by telephone in Canada in 1929 was 2,525,500,000, which was an average of 1,830 conversations per telephone and 257 per capita. That was a higher average than for any other country, that for the United States being 230.7 per capita in 1928.—*Reuter* (Ottawa).

International Telephony.—NEW CIRCUITS.—In order to meet the continued growth of traffic between Britain and France, additional circuits to Paris and Marseilles have been brought into service, making a total of 35. They are all operated from the London trunk exchange. Thirty-one terminate in Paris, and one each in Calais, Boulogne, Lille, and Marseilles.

Rumania.—TELEPHONY.—As from the beginning of the present year the State telephone service has been taken over by the International Telephone and Telegraph Corporation, which has handed it over for operation by an affiliated concern known as the Societatea Romano de Telefoane. Under the terms of the concession, which is to run for 20 years, thirteen of the principal exchanges in the country are to be converted to automatic working, and a second affiliated concern, the Societatea Standard Electrica Romana, is being organised to manufacture the necessary material in Rumania.

The Telephone Service.—LONDON PROGRESS.—The local Advisory Committee's annual report for 1930 (superintending engineer: Mr. E. Gomersall) shows that during that year the London area exchanges increased by 13 to 150, of which 114 were manual, 32 automatic, 2 toll, one trunk, and one tandem (junction switching). Direct exchange lines increased by 24,461 to 409,200. In addition, there were 16,871 private telephones, not connected to the public exchanges. The total number of telephones (exchange and private) was 703,500, an increase of 41,523, or 6.3 per cent. The net growth was slightly less than last year, but the rate of cessations during the last month or two of the year showed some tendency to decline. The number of new-type instruments, combining transmitter and receiver in one piece, in use in the London area was 13,500. Of the 29,294 private branch exchanges, 138 were automatic. The number of overseas calls (continental and

radio) increased by 14,726 to 545,600. Incoming toll lines increased by 110 to 1,287 and outgoing ones by 180 to 1,078; trunk and toll exchanges handled 182,560 calls daily. Local calls numbered 668 millions, an increase of 3.1 per cent. Phonograms exceeded 2,200,000 in number, the total number of telegrams delivered by telephone having been 1,150,000: telephonically addressed telegrams were increasing, the daily average being 730.

Some 26 per cent. of the direct exchange lines within a 10-mile radius of Oxford Circus had been connected to automatic exchanges; 7 new auto-exchanges were opened, auto-switching apparatus was being installed in 6 and being made for 8 others, so that 44 are to be opened during the next four years New manual exchanges numbered 13, four were being constructed, and the equipment of four was extended. Sites for 8 exchanges were acquired and negotiations were in hand for 27 others. The length of single-wire provided for subscribers' lines and local junctions increased by 153,643 miles to 2,945,987; junction circuits between exchanges numbered 52,000. Call offices and kiosks totalled 5,296, of which 1,229 were connected to auto-exchanges. Nearly 1,100,000 directories, weighing 2,500 tons and each containing 374,000 entries, were issued.

During the year 126 operators employed by subscribers in London were trained; the exchange operating staff numbered 11,500 and over 400 female and 170 male telephonists were recruited. Engineering workmen numbered 8,700 and 1,460 men attended training courses.

Newcastle-upon-Tyne Automatic Area.—The complete service in Newcastle-upon-Tyne was changed over to automatic operation on January 31st. There are 13 exchanges and some 17,500 subscribers in the district. The new equipment was manufactured by Standard Telephones & Cables, Ltd., and is capable of serving 70,000 subscribers.

United States.—New Radio-Beacon.—A new radio-beacon to guide ships through the Straits of Florida is shortly to be established at the Fowey Rocks lighthouse, according to the Lighthouse Service of the Department of Commerce. That offshore lighthouse already possesses powerful light- and fog-signalling equipment, but the addition of a radio-beacon will be of great value to the numerous ships that pass through those straits to and from ports in the Gulf of Mexico; the route is extensively used for the transport of petroleum products, cotton, and raw materials coming from the Gulf States.—*Reuter's Trade Service* (New York).

Radio Notes.

America.—800 Stations.—On January 1st there were 615 broadcasting stations licensed to operate in the United States. These and Canada's 70 stations, Cuba's 60, Mexico's 35, and a few in Central America and the West Indies bring North America's total to about 800, fully double the number of stations in all other countries of the world combined, points out the *Wireless World*. South America, according to the latest Department of Commerce compilation, has 106 stations, including 43 in Argentina, 26 in Uruguay, 23 in Brazil, and 6 in Chile.

Battery Eliminators—Replacements.—With reference to the replacement of radio apparatus rendered unsuitable by changes-over of electricity distribution systems from d.c. to a.c., the Tilbury Urban Council has decided to offer each user of a mains-operated set a rectifier of an output of 20 mA, or, alternatively, a cash payment not exceeding £2 in full settlement of all claims, says the *Wireless Trader*. The Burnley Electricity Committee has, however, refused to accept any liability, maintaining that special circumstances governed those cases in which it replaced certain component parts. In other cases it suggests arbitration.

Canada.—Stations' Ranges.—The present situation respecting radio as between Canada and the United States is described as unsatisfactory, as Canada has 70 stations with a power of 33,000 watts and an assured range of 266,000 sq. miles, while the United States has over 660 stations reaching Canada with a total power of 679,000 watts and a range of 736,000 sq. miles. —*Reuter.*

France.—Railway Train Reception.—The State Railway have now equipped 22 trains with broadcast receiving equipment, which enables passengers to listen to concerts transmitted from French and foreign stations, and also to hear gramophone records played on the trains themselves.

Germany.—Interference.—In view of the increasing number of complaints anent interference with radio broadcast reception caused by electric tramways and other electrical installations, the German Electro-technical Engineers' Association recently appointed a special committee to inquire into and prepare a report on the subject. All bodies interested in the subject, the Post Office, the Broadcasting Co., the Union of Electric Power Stations, the Central Union of Electrical Manufacturers, the Radio Manufacturers' Association, and the Union of Traffic Undertakings, are represented on the Committee, which intends to deal with the inquiry in an exhaustive manner.

Station Congestion.—International Conference.—Vice-Admiral C. D. Carpendale, controller, and Mr. Noel Ashbridge, chief engineer, represented the B.B.C. at the international conference of broadcasting authorities this week at the Austrian mountain town of Semmering. The German and British delegates are seeking means of avoiding interference between the Mühlacker and London regional transmitters, but the main business of the conference is to draw up an agenda for the international convention that is to be held at Madrid in Spain next year. A suggestion has been made for the formation of an international bureau with power to allot to each European station a wave-length and to stipulate its maximum power and operating conditions in an attempt to reduce congestion.

United States.—Wireless Trade.—Of the 24,000,000 wireless sets now in use in the world, 10,500,000, or over 40 per cent., are of American manufacture, according to a survey by Mr. Lawrence D. Batson, of the United States Department of Commerce. The total value of all sets amounts to about 1,500,000,000 dollars and American sets represent about 676,000,000 dollars' worth of that total. The total investment in broadcasting stations in the world is some 29,000,000 dollars, half of which represents stations in the United States. Although claiming that American sets are regarded as superior to the great majority of foreign makes, Mr. Batson admits that both England and Germany have made great advances in developing wireless sets. The United States is the largest exporter in the world of wireless sets. Foreign sales rose from about 9,000,000 dollars' worth in 1927 to 12,000,000 dollars' worth in 1928, and to over 23,000,000 dollars' worth in 1929. Figures for the first ten months of 1930 show that export sales totalled 17,800,000 dollars.—*Reuter's Trade Service* (Washington).

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the Electrical Review containing the advertisement is given in parentheses below.

Contracts Open.

Argentina.—Buenos Aires.—February 16th. Argentine National Sanitation Works Department. Water supply and drainage works, involving the supply of underground cable, generating sets, &c. (G.X. 10,002.)*

Australia.—Melbourne.—Posts and Telegraphs Department. February 17th. Electric lamps, lamp caps and sockets for voltages from 4 to 50. (A.X. 10643.)*

February 24th. Resistances in vitreous spools ranging from 100 to 4,000 ohms. (A.X. 10642.)*

March 17th. 80 miles of rubber-insulated, cotton-covered twisted conductors. (A.X. 10697.)*

March 31st. Single- and double-wound resistance spools. (A.X. 10754.)* Lead-covered telephone switchboard cable. (A.X. 10753.)*

April 7th. Testing instruments. (A.X. 10755.)*

Sydney (N.S.W.).—April 8th. Government Railways. One 2,500-kW alternator for Lithgow power station. (A.X. 10761.)*

Belgium.—Brussels.—March 4th. Telegraph & Telephone Department. Supply and laying of telephone cables between (1) Ghent and La Panne, (2) Brussels and Dinant, (3) Brussels and Mont Saint Jean, (4) Charleroi and Mons, (5) Mons and the French frontier, and (6) Liege and the German frontier. Particulars (Cahier des Charges special No. 3542) for 25 fr. from Regie des Telegraphes et Telephones.

Cheadle and Gatley.—February 10th. Electricity Department. General supplies for twelve months. (January 16th.) Transformer and switch kiosk, a 6,600-V truck cubicle, and e.h.p. cable. (January 23rd.)

Chile.—Santiago.—March 10th. Port Works Department. Ministry of Marine. Three electric slewing and travelling cranes, with portal, for the Port of Iquique. (A.X. 10740.)*

Denmark. — COPENHAGEN. — February 11th. Municipal Council. Switchgear for the H. C. Oersted power station. (A.X 10748.)*

Dundee.—February 11th. Electricity Department. 4-ton overhead travelling hand crane. (January 9th.) L.p. cable. (January 30th.)

Egypt. — CAIRO. — February 23rd. Ministry of Public Works. Generating, distributing, and pumping plant for Naga Hamadi barrage. (A.X. 10664.)*

March 31st. Supply and erection of h.p. overhead transmission lines in isolated basins of Upper Egypt. Copy of specifications and conditions of tender can be obtained from the Office of the Chief Inspecting Engineer of the Egyptian Government, 41, Tothill Street, Westminster, S.W.1, against payment of £E10. —*Reuter's Trade Service* (Cairo).

SAMANOD.—February 28th. Ministry of the Interior. Supply and installation of an electrical distribution system for the town. (A.X. 10659.)*

Farnworth.—February 9th. Electricity Department. L.p. cable. (January 23rd.)

Fife.—February 16th. County Council. Heating and electrical work at Markinch Public School. Schedules (deposit £1 1s.) from Mr. G. Sandilands, architect, Education Offices, Kirkcaldy.

Halifax.—Town Council. February 9th. Electricians' work (wiring only) required in erection of 14 houses, Moor End Road. Specification (deposit £1 1s.) from Mr. A. C. Tipple, borough engineer, Crossley Street.

Harrogate. — February 27th. Electricity Department. General stores for twelve months. (See this issue.)

Hastings.—February 10th. Electricity Department. General supplies for twelve months. (January 16th.)

Hull.—February 16th. Electricity Department. Electrically-operated sluice valves (42 in. and 48 in.). Mr. J. N. Waite, city electrical engineer, electricity works, Sculcoates Lane (deposit £2). Static transformers. (January 30th.)

Ilford.—February 9th. Electricity Department. Rectifier and switchboards. (January 23rd.)

Leeds.—February 17th. Electricity Department. General stores for twelve months. (January 30th.)

London.—COUNTY OF LONDON ELECTRIC SUPPLY CO., LTD.—February 9th. Main, auxiliary and multi-core cables and accessories for connections between the new and existing switch houses at Barking power station. (January 9th.)

CENTRAL ELECTRICITY BOARD.—February 9th. Construction of site works, foundation works and buildings at Wigan and Southport in connection with North-West England and North Wales Electricity Scheme. (January 9th.)

February 16th. 66,000-V and other cables in connection with the North-East England Electricity Scheme. (January 16th.)

February 23rd. Construction of site works, foundation works and buildings in connection with the North-East England Electricity Scheme. (January 30th.)

March 2nd. Central indication and telephone equipments in connection with the South-East England Electricity Scheme. (January 16th.)

March 9th. 33-kV overhead transmission lines in connection with the North-West England and North Wales Electricity Scheme. (January 30th.)

March 2nd. Construction of central control station building at Leeds in connection with the Mid-East England Electricity Scheme. (See this issue.)

INDIA STORE DEPARTMENT.—February 10th. Cells. (See this issue.)

L.C.C.—February 10th. Wiring and fittings for electric lighting for public staircases in tenement buildings in Stepney and Poplar. (January 23rd.)

February 17th. Wireless installation at Tooting Bec Hospital. (January 30th.)

February 16th. Wiring and fittings for electric lighting in tenement dwellings at the Stamford Hill housing estate, Hackney. (January 30th.)

HAMMERSMITH.—February 25th. Borough Council. General electrical stores for twelve months. (January 30th.)

Manchester.—February 9th. Electricity Department. Electric cooking ranges. (January 30th.)

February 10th. Transport Committee. Permanent-way points, tongues and crossings, and general stores, including: Schedule A.—Commutator segments, armature coils, controller fingers, switches, bells, cells, &c., insulating material, overhead equipment material, tramcar trolley poles, electrodes for welding. Schedule B.—Cable (power and lighting), galvanised steel cable. Schedules from general manager, Corporation Transport Department, 55, Piccadilly.

New Zealand.—WELLINGTON.—Public Works Department. February 24th. One set of 110-kVA outdoor switchgear, steelwork and controlling equipment. (A.X. 10507.)*

March 17th. 11,000-V switchgear and metering equipment for controlling a 15,000-kVA sub-station. (A.X. 10719.)*

April 9th. Government Railways. Transformers, armoured cable, instrument transformer, cable boxes, instruments, static condensers, and isolating links. (A.X. 10758.)*

April 14th. Four single-phase 110-kV transformers. (A.X. 10721.)*

Post and Telegraph Department. March 3rd. Carbon diaphragms for telephone instruments. (A.X. 10720.)*

March 19th. 300 indicator alarm fuses. (A.X. 10747.)*

March 31st. 500 5-conductor cords. (A.X. 10746.)*

Northern Ireland.—BELFAST.—February 14th. Electricity Department. Steam boiler plant. (January 9th.)

February 21st. General stores for twelve months. (January 30th.)

March 4th. Police Committee. Automatic traffic-control equipment. (January 30th.)

February 10th. Tramways Department. General stores for twelve months. (January 30th.)

February 9th. London, Midland and Scottish Railway, Northern Counties Committee (Ireland).—Twelve months' supply of stores, including telegraph ironwork, wire, electric lamps, porous pots, &c.—Form of tender, &c., No. 26, from Mr. F. J. Martin, Stores Superintendent, York Road Station.

Plymouth.—February 14th. Corporation. Meters, time switches, cables, transformers and e.h.p. switchgear. (January 23rd.)

February 21st. Corporation. Cast-iron pipes, circulating water screen, &c. (See this issue.)

South Africa.—PRETORIA.—March 13th. Town Council. Condensing plant and auxiliary apparatus for one or two large turbo-alternators. (G.X. 10,001.)*

JOHANNESBURG.—Railways and Harbours. February 16th. Material for colour light railway signalling. (A.X. 10662.)*

DURBAN.—February 20th. Corporation. Traffic control signals. (A.X. 10687.)*

CAPE TOWN.—February 18th. Electricity Department. L.p. ironclad switchgear for controlling lighting and power circuits on a 380/220-V, 50-cycle, 3-phase, 4-wire a.c. system. (A.X. 10741.)*

March 12th. Airport illuminating equipment. (A.X. 10752.)*

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed.

Ayrshire.—County Council. Accepted :—
Electrical work at new academy at Ardrossan.—C. Price and Son.

Barking.—Electricity Committee. Recommended :—
Two 250-kVA transformers (£251).—Crompton Parkinson, Ltd.

Birmingham.—Education Committee. Accepted :—
Electric lighting instalation at Highters Heath Council school (£605), Severn Street school (£1,097), and extension to electric lighting installation at Jenkins Street school (£109).—T. Glover.
Electric lighting installation at Kelby Close school (£1,517) and extension to installation at Selly Park school (£160).—Ellis & Ward, Ltd.
Electric lighting installation at Oakley Road school (£425).—W. S. Vaughton, Ltd.
Improvement of lighting at Farm Street school (£65).—Gordon Hughes Electrical Co.
Improvement of lighting at Aston Technical College (£134) and Handsworth Technical College (£88).—Baxter and Impey.
Construction of new power lines at Erdington Cottage Homes (£219).—R. H. Newton.

Bridlington.—Town Council. Accepted :—
11-kV switchgear for the central sub-station (£2,065).—A. Reyrolle & Co., Ltd.

Chingford.—Metropolitan Water Board. Accepted :—
Steam-driven electric lighting set at pumping station (£171).—Belliss & Morcom, Ltd.

Halifax.—Town Council. Accepted :—
Electrical work at 114 houses at Sandhall Lane (£431).—J. Pilling & Co.

Hull.—Education Committee. Accepted :—
Electrical installation at Williamson Street School (£540).—John Shaw & Co. (Electrical), Ltd.
Telephones Committee. Recommended :—
Cable (£396).—Siemens Schuckert, Ltd.
Bronze wire (£222).—T. Bolton & Sons.
Lead-in wire (£54).—W. F. Dennis & Co.
Inside wire (£81).—W. T. Henley's Telegraph Works Co., Ltd.

Liverpool.—Mersey Docks and Harbour Board. Accepted :—
Cables.—British Insulated Cables, Ltd.

London.—L.C.C.—Housing Committee. Accepted :—
Electrical installation at Levita House, Ossulston Estate, St. Pancras (£1,686).—Saunders & Co.
Wiring and fittings for electric lighting of 39 blocks of dwellings at Streatham Hill Estate (£2,392).—Building & Colliery Supply Co., Ltd.
(The accepted tender was the lowest of 19 received, the highest being £4,901.)
Highways Committee. Accepted :—
Tramcar equipment spares (schedule equipment).—Metropolitan-Vickers Electrical Co., Ltd.
Porcelains for track insulator standards.—Electric and Ordnance Accessories Co., Ltd.

Motor equipments for experimental tramcar.—Metropolitan-Vickers Electrical Co., Ltd.
Specially insulated armatures and field coils.—Baldwin Electrical Co.
Electrically-driven pneumatic ash-removing plant at Woolwich Ferry.—Ashwell & Nesbit, Ltd.

Stores and Contracts Committee. Accepted :—
Re-organisation of wiring and fittings for electric lighting at Peckham Rye stores depôt (£508).—H. J. Cash and Co., Ltd.
Insulating materials.—L. Andrew & Co.; J. Bonas & Son; British Central Electrical Co., Ltd.; Hamnet and Andrew; Hooper's Telegraph & India Rubber Works, Ltd.; L. P. S. Electrical Co., Ltd.; Micanite and Insulators Co., Ltd.; Pomona Rubber Co.; Rykneld Mills Co.

Main Drainage Committee. Accepted :—
Centrifugal sewage pumping machinery, electric motors, switchgear and auxiliary equipment for Deptford pumping station (£13,800).—Mirrlees Watson Co., Ltd.

Fire Brigade Committee. Accepted :—
Wiring and fittings for electricity at Whitechapel fire station (£245).—Carr Bros. & Co.

Maidenhead.—Town Council. Accepted :—
Renewing the battery plates at power station (£393).—Tudor Accumulator Co., Ltd.

Malton.—Rural District Council. Water Committee. Recommended :—
Pumping plant and electrical equipment (£1,884).—Drysdale & Co., Ltd.

Manchester.—Health Committee. Accepted :—
Electric bed lift for Crumpsall Hospital.—Etchells, Congden & Muir, Ltd.

Waterworks Committee. Acepted :—
Electrically-driven haulage winch.—Tangyes, Ltd.

Education Committee. Accepted :—
Electrical installation at Moston Lane Clinic.—Sudlow and Co.
Electrical installation at Levenshulme Clinic.—A. Louden.

Electricity Committee. Accepted :—
Static transformers for 12 months.—Metropolitan-Vickers Electrical Co., Ltd.
Weldless steel spigot and faucet tubes.—British Mannesmann Tube Co., Ltd.; Stewarts & Lloyds, Ltd.
Maintenance of traction battery.—Chloride Electrical Storage Co., Ltd.
6,600-V switchgear for Dickinson Street station.—Ferguson, Pailin, Ltd.
Outdoor-type sub-station kiosk and switchgear for Heald Green.—Ferguson, Pailin, Ltd.

Housing Committee. Accepted :—
Electric lighting installations at Newton Heath housing estate.—Hall & Stinson, Ltd.
Electric lighting installations at Rider Brow estate.—R. H. Clampett & Co.

Oldham.—Electricity Committee. Accepted :—
Cable.—Union Cable Co., Ltd.

Reigate.—Town Council. Accepted :—
Spare parts for plant at the electricity works.—Mirrlees, Bickerton & Day, Ltd.

Salisbury.—Joint Isolation Hospital Committee. Accepted :—
Rewiring installation at the hospital (£349), replacement cable and cleaning and overhauling the boxes.—Salisbury Electric Light & Supply Co., Ltd.

Sheffield.—Tramways Committee. Accepted :—
Fifty tramcar traction motors (£355 per pair).—Metropolitan-Vickers Electrical Co., Ltd.
Forty car sets of control and braking system (£202 per set).—Maley & Taunton, Ltd.

Electricity Committee. Accepted :—
Outdoor switchgear for sub-stations (£2,531).—A. Reyrolle and Co., Ltd.

Watch Committee. Accepted :—
Six semaphore signals and control kiosk (£640).—Brighton Lighting and Electrical Engineering Co., Ltd.

Smethwick.—Health Committee. Accepted :—
Electric sterilisers at clinic on the Firs Estate.—General Electric Co., Ltd.

Housing Committee. Accepted :—
Electric lighting, direct labour schemes.—Etna Lighting and Heating Co., Ltd.

Warmley (Glos.).—Rural District Council. Accepted :—
H.p. and l.p. cable network with sub-station equipments (£16,227).—Macintosh Cable Co., Ltd.

German Electric Bakeries.

Germany is utilising electricity more and more for her bakeries, and recent statistics show that the capacity of the 324 bakeries installed during the year just ended amounts to 11,350 h.p. Besides those new bakeries 270 electric stoves have been installed in restaurants, representing not only 26,000 h.p., but also an immense advance in cleanliness and atmospheric purity.

Forthcoming Events.

Association of Mining Electrical Engineers (South Wales Branch).—Saturday, February 7th. Royal Hotel, Cardiff. Annual dinner.

Electrical Power Engineers' Association (Northern Division, Manchester Section).—Saturday, February 7th. Cheetham Town Hall, Manchester. 6.30 p.m. Social evening and dance.

(London Local Group).—Tuesday, February 10th. Junior Institution of Engineers. "132,000-V Cables." Mr. A. J. Crystall.

Institute of Marine Engineers.—Monday, February 9th. Institute, London. 6 p.m. "Water Tube and/or Scotch Boilers." Messrs. H. E. Yarrow and S. Hunter, junior.

Institution of Electrical Engineers.—Monday, February 9th. Institution, London. 7 p.m. Informal meeting. Discussion on "Maintenance Service to Consumers in Rural Areas." Opened by Mr. R. W. L. Phillips. Thursday, February 12th. Connaught Rooms, Kingsway, W.C. 7 for 7.30 p.m. Annual dinner and reunion.

(Meter and Instrument Section).—Friday, February 6th. Institution, London. 7 p.m. Short papers.

(North-Eastern Centre).—Friday, February 6th. Literary and Philosophical Society, Newcastle-upon-Tyne. 7 p.m. Faraday lecture, "The Birth of Electrical Engineering." Prof. W. Cramp. Monday, February 9th. Armstrong College, Newcastle-upon-Tyne. 7 p.m. "Two Transmission Line Problems: Suspension Insulators for Industrial Areas in Great Britain; Conductor Vibration." Mr. P. J. Ryle.

(South Midland Students' Section).—Saturday, February 7th. Combined visits to Stourport power station and the Steatite and Porcelain Products Company's works, Stourport.

(North Midland Centre).—Tuesday, February 10th. Hotel Metropole, Leeds. 7 p.m. Informal discussion on "Earthing and the Safety of the Public, with Special Reference to Domestic Apparatus."

(North-Western Centre).—Tuesday, February 10th. College of Technology, Manchester. 7.30 p.m. Faraday lecture, "The Birth of Electrical Engineering." Prof. W. Cramp.

(Scottish Centre).—Tuesday, February 10th. North British Station Hotel, Edinburgh. 7 p.m. "The Metering of Three-phase Supplies." Mr. O. Howarth.

(East Midland Sub-Centre).—Tuesday, February 10th. College, Loughborough. 6.45 p.m. "Loud-speakers since their Conception with Gramophone Pick-ups and Wireless Recording Apparatus," by Mr. S. G. Brown. (To be delivered by Major C. A. Russell Stower.)

(London Students' Section).—Wednesday, February 11th. 2.30 p.m. Visit to the Columbia Graphophone Co., Southfields.

(Dundee Sub-Centre).—Thursday, February 12th. University College, Dundee. 7.30 p.m. "Commercial Aspects of Electrical Engineering." Mr. J. M. Paterson.

(North-Eastern Students' Section).—Friday, February 13th. Armstrong College, Newcastle-upon-Tyne. 7.15 p.m. Address by Mr. B. H. Leeson.

Royal Institution.—Tuesday, February 10th. Institution, London. 5.15 p.m. "The Raman Effect." Sir William Bragg.

Illuminating Engineering Society.—Tuesday, February 10th. Trocadero Restaurant, London. 7 for 7.30 p.m. Annual dinner and dance.

Institution of Engineers and Shipbuilders in Scotland.—Tuesday, February 10th. Institution, Glasgow. 7.30 p.m. "Electric Welding in the Construction of Sea-going Vessels." Mr. G. Wahl.

Institution of Engineers-in-Charge.—Wednesday, February 11th. Brooklyn Hall, Bush House, Strand, W.C. 7.30 p.m. "Talking Pictures." Mr. J. I. Martin.

Institution of Engineering Inspection.—Wednesday, February 11th. Royal Society of Arts, London. 5.30 p.m. "Steel Foundry Welding." Mr. V. Gordon Pearson.

Television Society.—Wednesday, February 11th. University College, Gower Street, W.C. 7 p.m. "The Stenode Radiostat and its Application to Television." Mr. E. L. Gardiner.

Electroplaters' and Depositors' Technical Society.—Thursday, February 12th. Motor Manufacturers and Traders, Ltd., London. Joint Meeting with the London Local Section of the Institute of Metals. "Electrolytic Processes in Metallurgy." Mr. H. J. T. Ellingham.

Electrical Engineers' Ball.—Friday, February 13th. Grosvenor House Hotel, Park Lane, W.

Faraday House Old Students' Association and Faraday House Rugby Club.—Friday, February 13th. Hotel Russell, London. 8 p.m.-2 p.m. Supper-dance.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of makers of the following devices:—

S.A.I.A. time switches (name of British agent wanted).
"WINKWORTH" electric bells.
"VESTA" electric sewing machine.
"ASTRA" or "ASTRO" reflectors.

Notes.

Electrically-propelled Tanker.

Scott's Shipbuilding & Engineering Co., Ltd., launched from its Cartsdyke yard at Greenock on January 31st the electrically-propelled oil tanker *Bermian*, which has been built for the Atlantic Refining Co., of Philadelphia, U.S.A.

The whole of the electrical installation, including motors for auxiliaries, has been supplied by the British Thomson-Houston Co., Ltd. The steering gear is of the electro-hydraulic type manufactured by Messrs. John Hastie & Co., Ltd., and is provided with a gyro-pilot for automatic steering.

The complete machinery installation has been designed and arranged to the requirements of Mr. Lester M. Goldsmith, consulting engineer to the Atlantic Oil Shipping Company, and, in addition, has been constructed to Lloyd's latest requirements.

National Diplomas.

The joint committee of the Institution of Electrical Engineers and the Board of Education for National Certificates and Diplomas in Electrical Engineering (England and Wales) reports that the results for the last three years have been as follows:—

	1928.	1929.	1930.
Ordinary certificates awarded ...	361	433	510
Higher certificates ,, ...	149	205	227
Post-higher certificates ,, ...	6	4	3
Ordinary diplomas ,, ...	8	10	20
Higher diplomas ,, ...	6	4	4
Total number of successful students	530	656	764
Total number of failures	339	428	442

B.S.S. for Apparatus for Testing Magnets.

The British Engineering Standards Association has just issued Specification No. 406-1931, for apparatus for the workshop testing of permanent magnets. It deals with the essential details of the construction and the working of apparatus suitable for use in workshops for the testing of permanent magnets of uniform cross-section, suitable for magneto-generators, and of other magnets the dimensions of which are within specified limits. The instruments covered by the specification are particularly designed for the rapid determination of the remanence, coercive force and the maximum value of the product B×H. They are arranged to give a direct indication of these quantities for any length or cross-sectional area of magnet within certain limits, and if desired the full hysteresis loop may be plotted. Two types of apparatus are described in the specification, differing essentially in the type of fluxmeter used. Both types are considered equally suitable for the practical measurement of the quantities referred to above. These two types (A and B) differ in that type A employs a pivoted moving coil carrying a known current and swinging in the field of the magnet under test, whereas type B employs a rotating disk driven at a known speed and in the field of the magnet under test, the induced electromotive force being measured by a millivoltmeter. The readings obtained from both types of apparatus are subject to certain errors, corrections for which may be applied, and for which detailed directions are given in the specification.

Copies of the specification may be obtained from the Publications Dept., British Engineering Standards Association, 28, Victoria Street, London, S.W.1, price 2s. 2d., post free.

The Electrical Association for Women.

The following special London fixtures have been arranged by the Association for women demonstrators and teachers. March 14th, 10.30 a.m., a special visit for teachers to the showrooms of Domestic Electrification, Ltd. March 17th, 7 p.m., a special meeting for women demonstrators to discuss "The Field for Women in the Electrical Industry—Training—Qualifications and Experience—Status," at 46, Kensington Court, W.8.; the discussion will be opened by Miss M. G. Reading. April 14th, 15th, and 16th, a three-days' course for women demonstrators; further particulars will be forwarded in due course.

The annual general meeting of the Glasgow and District Branch of the Association was held on January 26th when Lady Belhaven and Stenton presided over a large attendance. The annual report submitted by Miss Kennedy showed that the past year had been one of continued progress and great activity. A luncheon followed at which the principal speaker was Mr. W. W. Lackie, electricity commissioner, who, referring to the absence of Sir Archibald Page, chief engineer, Central Electricity Board, who was to have addressed the meeting, explained that Sir Archibald had been ordered by his medical adviser to abstain from all public engagements for some months. Mr. Lackie outlined in a very interesting manner the progress made in recent years in the electricity supply industry, and dealt with some of the more important events, including the establishment and work of the Electricity Commissioners and the Central Electricity Board, the development of the domestic load, and the recent work done in connection with the prevention of the emission of black smoke, grit, sulphur, &c., from power-station chimneys. His optimism led him to quote from the work of the French novelist Zola, who wrote 30 years ago:—

> "The day will come when electricity will be for everyone as the water of the rivers and the wind of Heaven. It should not merely be supplied but lavished, that men may use it at their will as the air they breathe."

Other speakers included Miss C. Haslett, C.B.E., director, E.A.W., who spoke on the educational side of the work.

We learn that the telephone exchange and numbers of the E.A.W. Headquarters have been changed to Western 4845 and 4846.

Appointments Vacant.

Accountant assistant for Portsmouth Electricity Department.

Mains engineer for the Llanelly and District Electric Supply Co., Ltd.

Clerk of Works for Warmley Rural District Council.

(See our advertisement pages to-day.)

Educational.

The new Technical College, Coatbridge, which is electrically equipped, was formally opened on Wednesday, January 28th by Sir Thomas Hudson Beare, B.A., B.Sc., Professor of Engineering, Edinburgh University. The college has cost £85,000.

Faraday House Association.

It is announced by the Faraday House Old Students' Association that the new officers for the current year are Mr. G. R. J. Parkinson, M.I.E.E., president; the Rt. Hon. The Earl of Rothes, vice-president; Dr. S. E. A. Landale and Messrs. R. C. Harpur, G. Whitmore, and H. C. Wilson, new members of Council.

Heat Treatment of Steel.

At a recent meeting of the Leicester Association of Engineers a lantern lecture was delivered by Mr. A. Glynne Lobley, M.Sc. (Birmingham Electric Furnaces, Ltd.), on "The Application of Electricity in the Heat Treatment of Steel." The chair was taken by Mr. M. H. Taylor, vice-president.

Resistance elements made of nickel-chromium acted quite as well as, and even had some advantages over, platinum. The use of that alloy opened the way to the industrial uses of electric furnaces; it was not a cheap element, but the difference between its cost and that of platinum was sufficiently great to make the necessary difference. Strip was best arranged in a zig-zag pattern and supported on the walls by means of hooks; it was not so easy to arrange as round wire, but spirals suffered some disadvantage in a trough as the back part was shielded by the front and the current had to be arranged for that limitation. A sinuous element was more open, but some spots would be a little shielded. Strip attached to refractory hangers was much better; while each type had its uses, he preferred strip element on metallic hooks for the higher current densities and higher temperatures. The objection that the larger surface of strip element was more open to oxidisation and made for a shorter life was not fair, because the surface area required was not really so much as with other elements. He had never known the elements to perish of oxidisation in a commercial electric furnace; when such damage occurred it was usually due to other causes. The walls of furnaces were extremely well insulated and any loss through them would be much less than ten per cent. The output was very uniform, and in this respect they were now able to obtain laboratory results in ordinary commercial work. Large batteries of such furnaces had been, and were being, installed all over this country and abroad. A great reason for their increased use was the reduction of the quantity of scrap. Electric furnaces should be tested for a period of not less than six months as short-period costs were deceptive.

Legal.

A DELAYED SUPPLY.—At the Keighley Police Court on January 29th, Mr. William Coleman was summoned by the Keighley Town Council for non-payment of an electricity account of £80 under an agreement made in July, 1927. It was stated that the defendant was informed on October 4th, 1928, that the cable had been completed; but the defence was that Mr. Coleman had been assured by the Corporation, on making the agreement, that the supply would be available in October, 1927, and when he found that it was not available, and there was no apparent prospect of it, he had to buy an oil engine. In consequence, although the line was completed a year later, he never took up the supply.

The agreement was that the defendant should pay a minimum of £40 per year, and to meet his needs the Department constructed 210 yards of overhead line at a cost of £42. The Corporation was safeguarded by a clause in the agreement by which it was undertaken that the supply should operate from October 1st, 1927, "or such later date as the supply shall be available to the consumer." These words, however, the defendant denied ever having seen. He said he signed the agreement on the assumption that it was an exact copy of a draft he had previously read. In November, 1929, the Department pointed out to Mr. Coleman that although he had taken no electricity he was liable to the minimum of £40 per year under the agreement, but he refused to pay this.

The magistrates decided that on the terms of the signed agreement Mr. Coleman must pay the £80 claimed, but they considered that there had been gross neglect on the part of the Electricity Department. Mr. Coleman's proper course would have been to cancel the order when it was not carried out by the agreed date. The fact that an order was made against him by that Court for payment of the £80 claimed did not in any way prejudice Mr. Coleman from suing the Corporation for damages through neglect.

PASSING-OFF ACTION.—In the Chancery Division on February 3rd Mr. Justice Maugham had before him a motion in the action of the London Electric Wire Co. & Smiths, Ltd., against the Perfecta Cycle & Radio, Ltd., for an injunction restraining the defendants from passing off electric cables and wire as "Glazite" or "Glazite pattern," "Glazite" being the registered trade mark of the plaintiffs. The defendants agreed to treat the motion as the trial of the action and submit to a perpetual injunction restraining them from infringing the plaintiffs' trade mark.

His Lordship made the order as agreed, with costs.

Institution of Electrical Engineers.

INFORMAL MEETING.—At the informal meeting of the Institution on January 26th, Mr. M. Whitgift was in the chair, when Mr. L. Murphy opened a discussion on "Reliable Fractional-Horse-Power Motors for Commercial Purposes." It was possible to produce polyphase motors reliable for certain conditions that would be far too severe for a d.c. machine, though those machines had been much improved of recent years, and the commutator troubles of old had been eliminated. Recent legislation compelled the substitution of a.c. for the d.c. needed for many services, and the practice was extending of using the existing mains to supply single-phase with all its disabilities for motor-power supply. Unintelligent design could be seen in many of the small machines on the market, while some were a positive danger to the user as well as extremely inefficient. He hated to think of legislation interfering with industry, but he really felt that much of the apparatus on sale in big stores ought to be prohibited.

Mr. F. Pooley said that fractional machines had to take the same pressure as big machines, so that the question of earthing was no digression. Then overloading was another severe factor that was of little consequence with a large-power motor. He pointed out what large business the extensive application of small motors meant nowadays, and said that orders for 1,000 or even 5,000 motors at a time were quite common; as the supply was so largely surrendered to the foreigner, it showed that British manufacturers did not realise the great volume of business awaiting them.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

Mr. G. H. Alabaster and **Mr. E. A. Gatehouse** have disposed of their family interests in the ELECTRICAL REVIEW to ASSOCIATED ILIFFE PRESS, LTD., and are relinquishing their personal connection with the journal as from the present week. They desire, however, to inform their friends that no change whatever is contemplated or probable in regard to either the policy of the paper or the remaining members of the organisation. For the present, private letters should be addressed to Mr. G. H. Alabaster at 104, West Hill, Putney, S.W.15, and to Mr. E. A. Gatehouse at Saxley Hill Barn, Horley, Surrey.

We regret to hear that **Sir Archibald Page,** chief engineer to the Central Electricity Board, has been ordered by his medical adviser to cancel his public engagements for some months.

Mr. A. T. Lambert, transport manager to the Maidstone Corporation, is to receive a grant of £200 from the Town Council for his services during the change-over from tramways to trolley vehicles.

Mr. J. A. Hartigan (late sales manager of the London Fan and Motor Co., Ltd.) has joined the Service Electric Co., Ltd., 243, Great College Street, N.W.1, as chief sales engineer.

Sir Arthur Balfour and the other members of the Trade Mission to Egypt sailed this week by the *Orama* and are due at Port Said on February 11th.

Mr. Matthew Baird was recently presented with a wallet of Treasury notes upon his retirement from the post of chief electrical engineer after 53 years' service with Messrs. John Watson, Ltd., at Earnock Colliery, Hamilton. This colliery was one of the first in Great Britain to employ electricity, lighting plant having been installed in 1880.

Mr. Joseph Priest, M.B.E., has been elected chairman for the current year of the Electric Light Fittings Association. Mr. Priest, who is well known to many of our readers, is the managing director of Osler & Faraday, Ltd., the selling organisation of F. & C. Osler, who, at their works in Birmingham, have specialised in the production of lighting fittings for over a century. Some five years ago, acting in conjunction with the late chairman, Mr. F. Winstanley, a director of the General Electric Co., Ltd., Mr. Priest assisted in founding the Electric Light Fittings Association, whose first chairman was Mr. J. N. Stephens of the British Thomson-Houston Co., Ltd. One of the first acts of the Association was to abolish, so far as its own members were concerned, the practice of trading on a sale or return basis, and its example has since been followed by other sections of the electrical industry with, we understand, beneficial effects all round.

Elliott & Fry. [*London.*

Mr. Joseph Priest, M.B.E.

The new Chairman of the E.L.F.A.

Mr. M. S. Thacker, B.Sc., charge engineer at Bristol Corporation Electricity Department, has secured an appointment as mains engineer with the Calcutta Electric Supply Corporation, Ltd. He will sail by the s.s. *Rajputana* on February 27th from Marseilles.

Mr. R. E. Buchanan, a director of Messrs. Noyes Bros., Pty., Ltd., electrical and general engineers, of Melbourne, Sydney, and Brisbane, is on a visit to this country. The company is represented in London by Messrs. McDonald, Scales and Co., 4, Chapel Street, E.C.2.

We have received from **Mr. C. R. Belling** an interesting snapshot of himself enjoying the winter sports in Switzerland. It is whispered that he had just been making strenuous efforts to increase his domestic electrical apparatus turnover there, irrespective of the big import duty on English-made electrical goods.

Left to right: Mr. T. E. H. Birley (Macintosh Cable Co., Ltd.); Mr. W. F. T. Pinkney (Newcastle-upon-Tyne E.S. Co., Ltd.); Mr. C. R. Belling; Mr. C. L. Arnold (M.K. Electric, Ltd.).

Mr. Belling and Friends in Switzerland.

We reproduce herewith a second photograph showing Mr. Belling and some friends at Pontresina.

In our last issue we stated that Mr. J. H. Shepherd had been appointed electrical engineer of Rawtenstall. **Mr. J. E. Shepherd** informs us that he was the engineer referred to. **Mr. J. H. Shepherd,** is his brother, and is borough electrical engineer of Harwich.

Miss G. Cuttriss, of Harrogate, has been appointed to take charge of the Stockton Corporation's newly-opened electricity showrooms in Bishopton Lane. The commencing salary is £200 per annum.

Mr. W. Crocker, M.I.Mech.E., has resigned from the position of works superintendent with Marconi's Wireless Telegraph Co., Ltd., Chelmsford, which he has held for a number of years. His present address is 40, Temple Lane, Silver End, Witham, Essex.

Mr. Jens Bache-Wiig has been appointed general manager of the Standard Electricitäts Gesellschaft A.G., Berlin, in which capacity he will have charge of the affairs of the Ferdinand Schuchhardt, Berliner, Fernsprech-und Telegraphenwerk A.G.; Mix & Genest A.G.; Telephonfabrik Berliner A.G.; and Suddeutsche Apparate Fabrik G.m.b.H., Nürnberg. Mr. Bache-Wiig was born at Eidsvold, Norway, in 1880, and from 1906 to 1911 he was with the Westinghouse Electrical and Manufacturing Co., Pittsburgh. He then became professor of electrical engineering at the Trondhjem Technical University, Norway, retaining this position until 1917, when he became managing director of the Electrisk Bureau, at Oslo, Norway. In 1926 he became managing director of the Standard Electric Aktieselskap, Oslo.

Mr. George Summers, general manager of the Stirling Boiler Co., Ltd., has been appointed a director of the company.

Mr. Walter Richards, of Johnson & Phillips, Ltd., and **Mr. C. Harland,** of Metropolitan-Vickers (Australia) Pty., Ltd., have been elected president and vice-president, respectively, of the Electrical Federation of Victoria.

Obituary.

Mr. W. E. Gray.—We learn with deep regret of the death which occurred on February 2nd, at 8, Morden Road, Blackheath, S.E.3., of Mr. William Ernest Gray, one of the managing directors of the India Rubber, Gutta Percha & Telegraph Works Co., Ltd., of Silvertown. Mr. Gray was 70 years of age. We hope to refer to his career in our next issue. The funeral is to take place to-day at East Wickham Church.

Mr. H. G. Cameron.—We regret to learn of the death of Mr. H. Gordon Cameron, who had been works superintendent of the Cosmos Lamp Works, Brimsdown, for three years. He was 45 years of age.

Herr H. Weiss.—The death recently occurred in Vienna of Herr Heinrich Weiss, a director of the Elin Electrical Co., of that city, and a leading Austrian authority on h.p. installations and their protection.

Mr. N. Smith.—The death is reported of Mr. Norman Smith, consulting engineer to the Calcutta Electric Supply Corporation, Ltd. Mr. Smith, who was 45 years of age, contracted "compressed-air" sickness while engaged on work in connection with the Hooghli tunnel.

Wills.— **Mr. Cecil Wilson,** the late chairman of Laurence, Scott & Electromotors, Ltd., left estate valued at £58,804 gross (£46,605 net personalty).

The late **Mr. Samuel Bridgwater,** principal of the Bridgwater Construction Co., constructional electrical engineers, Holloway, N., left £25,318 (£1,619 net personalty).

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares.

New Companies Registered.

Pala Battery Co. (London), Ltd.—Private company. Registered January 30th. Capital, £500 in £1 shares. Objects: To carry on the business of manufacturers of, dealers in, and agents for electrical appliances, fittings and accessories for light, heat, power, radio-telegraphy, &c. The directors are:—R. Pala and P. Morgenstern, 5, Stanhope Gardens, South Kensington, S.W.7. Secretary: P. Morgenstern. Solicitors: Rehder & Higgs, 29, Mincing Lane, E.C.3.

Radio and Allied Sales, Ltd.—Private company. Registered January 30th. Capital, £5,000 in £1 shares. Objects: To adopt an agreement with S. G. Brown, Ltd., to carry on, develop and turn to account the business and selling rights referred to therein, and to carry on the business of manufacturers and producers of and dealers in apparatus, instruments, machines and materials of all kinds for use in connection with wireless telegraphy, gramophones, &c. The subscribers (each with one share) are: R. Willis, 21, Eton Court, N.W.3, and C. Y. Tucker, 11, Lanchester Road, Highgate, N.6, company directors. Solicitors: Godden, Holme & Ward, 34, Old Jewry, E.C.2.

A. J. Reed & Co., Ltd.—Private company. Registered January 30th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers, wholesale and retail paper workers, dealers in electric hardware, &c. The directors are: S. G. Couldrey, Northdale, Victoria Road, Worthing; H. E. Steer, 156, Perry Vale, Forest Hill, S.E.23, electrical goods factor. Registered office: 80, Borough High Street, S.E.1.

Associated Electric Laboratories, Ltd.—Private company. Registered January 31st. Capital, £100 in £1 shares. Objects: To carry on laboratory, research, experimental, scientific and technical works of all kinds, &c. The subscribers are: E. Rudland, and L. Bancroft, 2, Bond Court, E.C.2, clerks. Solicitors: Linklaters & Paines, 2, Bond Court, Walbrook, E.C.2.

Prentice, Ltd.—Private company. Registered January 29th. Capital, £15,000 in £1 shares (5,000 6 per cent. "A" cumulative preference, 5,000 8 per cent. "B" cumulative preference, and 5,000 ordinary). Objects: To acquire the business of an electrical engineer and manufacturer of electrical accessories carried on by H. B. Prentice at Low Hall Mills, Holbeck, Leeds, as "The Electrical Accessories Manufacturing Co." The directors are: H. B. Prentice and H. W. Prentice, Primley Park Road, Alwoodley, Leeds, electrical engineers. H. B. Prentice is permanent governing director subject to holding half the ordinary shares. Secretary: W. Steele. Registered office: Progress Works, Low Hall Mills, Holbeck Lane, Leeds.

New Synergy Co., Ltd.—Private company. Registered January 30th. Capital, £100 in 1s. shares. Objects: To acquire the business of electricians formerly carried on by O. Songest as the "New Synergy Co.," at 43, Johnson Street, Westminster, S.W.1. The directors are: E. J. Evershed (managing director), Thanet House, 231, Strand, W.C.; F. G. Warne, address not stated. Secretary: G. E. Evershed. Registered office: Thanet House, 231, Strand, W.C.

Geo. Ray & Co., Ltd.—Private company. Registered January 26th. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in dynamos, magnetos, coil ignition parts, carbon brushes, and their component parts, and of all accessories to and component parts of automobiles, &c. The subscribers are: W. P. Gooding, 37, Queen Alexandra Mansions, Judd Street, W.C.; H. L. Wilkins, 77, Addington Mansions, Highbury, N.5. W. P. Gooding is the first life director and chairman. Secretary: H. L. Wilkins. Registered office: 615, Bank Chambers, High Holborn, W.C.1.

St. Andrews Wireless Depot, Ltd.—Private company. Registered January 26th. Capital, £600 in £1 shares. Objects: To carry on the business of wireless, electrical and mechanical engineers, &c. The permanent directors are: R. S. E. Hill, 53, Gipsy Lane, Norwich, wireless dealer (chairman); H. W. Hubbard, 91, Gipsy Lane, Norwich, radio engineer (vice-chairman); Mrs. Rose E. Hill, 53, Gipsy Lane, Norwich; and Mrs. Beatrice Hubbard, 91, Gipsy Lane, Norwich. Solicitor: C. Stratford, Norwich.

Eden Valley Electrical Co., Ltd.—Private company. Registered January 24th. Capital, £500 in £1 shares. Objects: To carry on the business of electrical engineers and contractors, suppliers of electricity, &c. The subscribers are: R. R. Sowerby, Winton House, Winton, Kirkby Stephen, Westmorland, solicitor; J. Donald, Grey Sables, Kirkby Stephen, Westmorland, electrical engineer. Solicitors: Richardson Sowerby, Holden & Co., 5, John Street, Bedford Row, W.C.1.

Electra (Birmingham), Ltd.—Private company. Registered January 24th. Capital, £1,000 in £1 shares. Objects: To acquire the business of electrical engineers and contractors now carried on by D. E. Hardie, M. W. Searle and I. H. Wheatcroft as "Electra Birmingham Co.," and to carry on the business of manufacturers of and dealers in weighing and measuring instruments, violet-ray and X-ray tubes and apparatus, surgical instruments and equipment, &c. The directors are: D. E. Hardie, Bandoola, Finchley, N.3; M. W. Searle, "Lyndon," Station Road, Lapworth, Warwickshire; I. H. Wheatcroft, 61, Belsize Avenue, Hampstead, N.W.3. Secretary: I. H. Wheatcroft. Registered office: 6, Gothic Arcade, Snow Hill, Birmingham.

Eastern Electric Installation Co., Ltd.—Private company. Registered January 29th. Capital, £500 in £1 shares (350 7½ per cent. cumulative preference and 150 ordinary). Objects: To acquire the business of electrical engineers and manufacturers carried on by R. A. Lochner and W. G. Graham at Anchor Street, Chelmsford, as the "Electrical Installation Company." The first directors are: R. A. Lochner, Forty Hill, Moulsham Thrift, Chelmsford, assistant engineer, Crompton Parkinson, Ltd. (governing director); W. G. Graham, Tofts Lodge, Little Baddow, electrical and radio engineer (both permanent). Solicitors: Copland & Sons, The Institute, London Road, Chelmsford.

Official Returns of Electrical Companies.

Hayward & Shepherd, Ltd.—Debenture dated January 19th, 1931, to secure £747 1s. 6d., charged on the company's undertaking and property, uncalled capital and book debts. Holder: J. Watt, LL.D., 28, Charlotte Square, Edinburgh.

Showler, Ltd.—Capital, £750 in 250 preference and 500 ordinary shares of £1 each. Return dated December 15th, 1930. 250 preference and 21 ordinary shares taken up. £271 considered as paid. Mortgages and charges, nil.

Baird Television, Ltd.—Capital, £825,000 in 2,100,000 ten per cent. non-cumulative preferred ordinary and 1,200,000 deferred ordinary shares of 5s. each. Return dated January 5th, 1931. All shares issued and fully paid up. Mortgages and charges, nil.

C. C. Fires, Ltd.—Capital, £5,000 in 4,425 preference shares of £1 and 11,500 ordinary shares of 1s. each. Return dated August 14th, 1930. 3,000 preference and 10,750 ordinary shares taken up. £3,187 10s. paid on 3,000 preference and 3,750 ordinary shares. £350 considered as paid on 7,000 ordinary shares. Mortgages and charges, nil. A return of allotments made up to December 22nd, 1930, shows 495 preference and 750 ordinary shares allotted, payable in cash and fully called up.

A. Bodkin & Co., Ltd.—Capital, £3,000 in £1 shares. Return dated December 12th, 1930. All shares taken up. £1,000 paid. £2,000 considered as paid. Mortgages and charges, nil.

Hepplewhite (Parkgate), Ltd.—Capital, £500 in £1 shares. Return dated December 31st, 1930. 175 shares taken up. £175 paid. Mortgages and charges, nil.

Central Power Engineering Co., Ltd.—T. J. McManis, 2, Foster Lane, E.C.2, ceased to act as receiver and manager on January 16th, 1931.

Climax Electric Co., Ltd.—Capital, £10,000 in 5,000 preference and 5,000 ordinary shares of £1. Return dated December 31st, 1930. 1,078 preference and 3,039 ordinary shares taken up. £1,617 paid on 1,078 preference and 539 ordinary shares. £2,500 considered as paid on 2,500 ordinary shares. Mortgages and charges, nil.

Hendon Electric Supply Co., Ltd.—Acknowledgment of indebtedness dated January 12th, 1931 (supplemental to trust deed dated February 23rd, 1928) to secure debenture stock for £50,000 in addition to £200,000 already registered, charged on the company's undertaking (authorised by the Hendon Electric Lighting Order, 1899, and Amendment Orders, 1900 and 1908) and all other assets, present and future, including uncalled capital. Trustees: Beaver Trust, Ltd., 1, Queen Victoria Street, E.C.4.

Johnson & Bolsom, Ltd.—Particulars filed of £2,490 debentures authorised January 19th, 1931, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £880.

National Lighting Co., Ltd.—Capital, £1,000 in £1 shares. Return dated December 22nd, 1930. All shares taken up. £800 paid, £200 considered as paid. Mortgages and charges, nil.

Daventry & Co., Ltd.—Capital, £1,000 in £1 shares. Return dated December 17th, 1930. All shares taken up. £750 paid, £250 considered as paid. Mortgages and charges, nil.

Drury Radio Co., Ltd.—Capital, £2,000 in £1 shares. Return dated August 30th, 1930 (filed January 2nd, 1931). All shares taken up. £2,000 paid. Mortgages and charges, nil.

England-Richards Fluid-Free Cell Co., Ltd.—Capital, £5,000 in 4,000 10 per cent. cumulative preference and 1,000 ordinary shares of £1 each. Return dated October 31st, 1930. 1,429 preference and 601 ordinary shares taken up. £1,730 paid on 1,429 preference and 301 ordinary shares, £300 considered as paid on 300 ordinary shares. Mortgages and charges: £1,400.

Consolidated Electrical Supplies, Ltd.—Capital, £100,000 in £1 shares. Return dated December 31st, 1930. Three shares taken up. £3 paid. Mortgages and charges, nil.

New Era Electrical Manufacturers, Ltd.—Capital, £100,000 in 50,000 preference and 50,000 ordinary shares of £1 each. Return dated December 31st, 1930. 1,504 ordinary shares taken up. £1,504 paid. Mortgages and charges, nil.

Viozone, Ltd.—Capital, £2,000 in 1,000 preference and 1,000 ordinary shares of £1 each. Return dated October 14th, 1930. All shares taken up. £800 paid on 800 preference shares, £1,200 considered as paid on 200 preference and 1,000 ordinary shares. Mortgages and charges: £7,000.

City Notes.

Baird Television, Ltd.

The adjourned annual meeting was held on January 27th, Lord Ampthill (chairman) presiding. In the course of his speech the chairman said that negotiations with the Pathé-Natan group had been successfully concluded, and the company contemplated by those negotiations incorporated under the name of "Television Baird Natan." The new company would work in close co-operation with them and with their associated company, Fernseh A.G., in Germany, and reciprocal visits between the principal engineers had been arranged to take place at frequent intervals. The Radio-Vitus station, from which television broadcasts would very shortly commence, had recently been acquired by the Pathé-Natan group. The present power of this station was 12 kW, which would shortly be increased to 30 kW, and ultimately, it was expected, to 70 kW. The transmissions would be from a standard Baird transmitter, so that programmes would be receivable, without modification, on an ordinary commercial Baird "Televisor," equipped with a suitable wireless receiver. Mr. F. Rowland had been invited to join the board, and Mr. H. J. Whitcomb had withdrawn his motion regarding the constitution of the directorate. The report and accounts were adopted.

Yorkshire Electric Power Co.

The accounts for the year ended December 31st last show a net profit of £342,558, as compared with £341,084 in the preceding year, to which is added £81,412 brought forward,

making £423,970 available. Dividends at the rate of 6 per cent. (less tax) for the year on the cumulative preference capital and at 8 per cent. (less tax) for the year on the ordinary capital are recommended. Reserve receives £100,000, plant renewals fund £10,000, and £83,501 is carried forward. The report states that there has again been a growth in the demand for electricity. The steadily increasing depression in trade and manufacture throughout the area has restricted the amount used for individual purposes, but with economies and improved efficiency, the net revenue has been maintained. The installation of new plant at Thornhill power station is progressing satisfactorily, and it is anticipated that it will be ready for use during the current year. A Special Order has been obtained to supply electricity in the urban district of Silsden. The report records the death of Mr. E. R. Benson, a director. Meeting: February 17th at Leeds.

German Companies.

Siemens & Halske A.G.—A net profit of £820,100 is reported for 1929-30, and a dividend of 14 per cent. has been declared on the common stock. The company's leading subsidiary, *Siemens-Schuckertwerke A.G.*, also reports a net profit of £491,350, and has declared a dividend of 7½ per cent., against 10 per cent. in the preceding year. The declaration of these dividends also fixes the amount of additional interest to be paid on the £4,800,000 6½ per cent. bonds issued for the two concerns jointly in 1926. An additional 1.128 per cent. will be paid on these bonds over and above the basic rate of 6½ per cent. per annum.

A dividend of 7 per cent. is announced by the *Allgemeine Elektricitäts Gesellschaft*, as compared with 9 per cent. a year ago. A net profit of £711,000 is reported, being a decrease of £247,000, while the turnover fell by £3,000 000 to £26,000,000, and the orders in hand by £5,000,000 to £12,500,000.

Nippon Electric Power Co., Ltd.

It is reported that Messrs. Harris Forbes & Co., and J. Henry Schroder & Co. have placed privately £900,000 of 7 per cent. trust certificates due January 29th, 1932, providing short term finance for the Nippon Electric Power Co., Ltd. The company will utilise the funds to repay bank loans contracted for construction work, and it is stated that the trust certificates will, at a later date, be refunded by a long-term bond issue. The certificates were well received, the allotments being on a basis of about 85 per cent. of applications. The Nippon Company has a generating capacity of 280,000 kW, and for the year ended September last earned a net income equivalent to over £1,500,000. It is principally a wholesaler of power, and has an extensive network of transmission lines connecting many important industrial areas, including those of Tokyo, Yokohama and Osaka.

Western New South Wales Electric Power Pty., Ltd.

It is reported that 500,000 of the £1 shares of this company, the formation of which was recorded in our issue of October 17th last, p. 661, have been taken up by the Zinc Corporation, and the Broken Hill South and North Broken Hill Companies. The company, which has a capital of £750,000, is issuing £700,000 of 8 per cent. first mortgage debentures at par and these will have a currency of 15 years. *The Times* reports that, in addition to its own directorate in Australia, the company will have an advisory committee in London, the members of which are Sir Robert Horne, Mr. C. L. Baillieu, and Mr G. W. W. Mackinnon.

Ross-shire Electric Supply Co., Ltd.

The directors have received an offer from the Scottish Power Co., Ltd., to acquire the whole of the ordinary and preference shares of the company by the exchange of these shares for the Power Company's shares. The shareholders have been notified of the offer and the directors recommend its acceptance. The Ross-shire Company was formed in 1926 with a capital of £60,000.

South Metropolitan Electric Tramways & Lighting Co., Ltd.

The *Financial News* reports that an extraordinary meeting was to be held yesterday (Thursday) to consider a resolution increasing the capital to £600,000 by the creation of 100,000 £1 ordinary shares.

Metropolitan Railway Co.

A final dividend of 2¼ per cent. is recommended, making 3½ per cent. for the year (against 4 per cent.) and £33,546 is to be carried forward. The final dividend on the surplus lands stock is to be 2½ per cent., making 4 per cent. for the year (against 3¾ per cent. in 1929).

City of Buenos Aires Tramways (1904), Ltd.

A final dividend of 1s. 3d. per share is announced, making 5 per cent. (same) for the year. Amortisation and general fund receives £8,500 (against £10,000), and £591 is carried forward.

Ever-Ready Trust & Finance Co.

A dividend of 4 per cent. (actual), less tax, has been declared on the ordinary shares.

Stocks and Shares.

TUESDAY EVENING.

IT is in the month of February that the Stock Exchange looks for a possible increase in Bank Rate, although at the beginning of the year speculation canvassed the possibility of the Rate going down to 2½ per cent. to bring it more into accord with the position as it then obtained in New York and Paris. Efflux of gold from this country has been so consistent and so considerable since then, however, that the indications now point in the opposite direction, and if February finishes without seeing a rise in Bank Rate there will be surprise in the City. This change of view is responsible for some weakening in the prices of the stocks and shares more particularly connected with movements in the money market. The 4½ per cent. debentures of the Central Electricity Board and the London and Home Counties Authority have both, for instance, gone back to ¼ discount below their issue price of 95½. There is on offer £20,000 Central Electricity 5 per cent. 1950-1970 stock at 104¾, free of stamp duty. The next interest payment is due in March. The return on the money is £4 17s. per cent. outright, and £4 15s. 6d. per cent. allowing for possible repayment at 100 at the earlier date.

Debenture Stocks on Offer.

London Power 5 per cent. debenture, which rose to 1¾ premium, receded to 1¾ premium. Fully-paid stock can be obtained at 101¾, which is 1¼ premium over the issue price of 100½. The first interest payment is due on October 1st, when the full six months' dividend will be met. Metropolitan Electric Supply 4½ per cent. first debenture can be bought at 95 to a modest extent. The yield is 4¾ per cent., and interest dates are the 1st January and July. Interest on the stock is covered some thirty-four times over by the profits of last year, and the security may be regarded as practically absolute. The stock is redeemable at any time at 110. A small amount of South London Electric Supply 4½ per cent. debenture stock is available at 96, the yield here being £4 13s. 9d. per cent., and a full dividend falling due on June 15th next. Against the annual interest of £13,500 required for the stock there were profits, last year, of £124,000. Another stock which is exceedingly well-margined in its interest and assets is Yorkshire Electric Power 5 per cent. debenture, the price of which is 104½, at which £5,000 is on offer. Interest falls due on the 1st May and November, and the yield at the present price is a little over 4¾ per cent. on the money. G.E.C. 5 per cent. debenture stock is steady at 103½.

London United Tramways 4 per cent. debenture stock has risen to 60, the persistent inquiry for the stock arousing some curiosity as to its reason. British Electric Traction 5 per cent. debenture strengthened to 101.

Metropolitan Railway Dividend.

The feature in the market for Home Railway stocks is a fall of 6½ points in Metropolitan Railway consolidated stock. This occurred on the announcement of a dividend making 3½ per cent. for the year, whereas the market had been looking for 4 per cent., the same as that declared for 1929. It was mentioned here last week (ELEC. REV., page 205) that the company had but a moderate advance in traffics for 1930, and will have to meet additional charges on the capital that was raised during the year. These two factors combined, no doubt, to influence the directors in their reduction of the dividend. At the present price of 60, the yield on the money, allowing for the accrued dividend, is nearly 6 per cent., which, compared with the return on Districts, looks modest. But there is, of course, always the speculative prospect of the Metropolitan being absorbed into the Underground group, or of being taken over by the Great Western Railway. Metropolitan Railway surplus land stock, upon which the dividend is slightly increased, is quoted at 79. The Underground group of companies will announce its dividends on Thursday in next week. The disappointment over the Metropolitan dividend led to a weakening in Underground Electrics, the price receding 1s. to 23s. 6d.

London Electricity Companies.

Apart from a little activity in Metropolitan Electric Lighting ordinary, the market in this particular group is very quiet. Dividends are beginning to appear for the latter half of 1930. It will be remembered that this year—1931—is the last before the period in which the dividend rates will be the standard 7 per cent. or thereabouts. Some of the companies are on a footing slightly different from that of the others: the County of London, the Charing Cross, and Metropolitan, for instance, and it is thought that in the case of certain of the others the standard rate of 7 per cent. may be improved upon from the start. From the point of view of safe calculation, however, the investor takes 7 per cent. as being the conservative basis on which to work, and it is on this rate of dividend that the yields are given in our weekly tables. The regulations apply, of course, to the London companies only, and do not affect in any way the provincial undertakings. With the latter the impression prevails that the companies are likely to maintain their present dividends until such time as trade throughout the country improves. The modesty of the returns offered by shares in the Scottish and Provincial companies is due to the

expectation that, as the use of electricity increases, these companies will require fresh capital that is likely to be issued in the shape of shares offered to proprietors at prices below those current at the time in the market.

Provincial Electricity Shares.

Lancashire Light & Power shares are easier at 23s. Egham and Staines have gone back to 39s. Richmond (Surrey) shares are at 44s. Isle of Thanet ordinary have drooped to 24s. There is a slightly easier tendency in the market for Urban shares, in spite of the announcement mentioned here last week that the company will redeem its outstanding 4½ per cent. debenture stock at the end of next July. Yorkshire Electric Power shares remain at 34s. The report, just out, says that during the past year sales have increased 2½ per cent., and the net revenue is £10,000 higher. Investment income has gone back a little. The 8 per cent. dividend represents the same rate as that declared for each of the past eleven years. The reserve fund is £675,000, and the carry-forward £83,500. To share premium account there is a credit of £92,000, and, as the capital is over-spent by nearly £330,000, this suggests that when times are propitious a new issue of shares will be made, no doubt on terms that will provide proprietors with a bonus. Electrical Distribution of Yorkshire ordinary are easier at 34s. 9d.

An Australian Issue.

The Western New South Wales Electric Power Proprietary Company is making an issue of £700,000 in 8 per cent. first mortgage debentures at 100. The company was formed in Australia last year in order to supply power to three of the largest Barrier companies dealing with base metals. The company contemplates the erection of a central power station to take the place of the existing system of separate units for the supply of power and compressed air to the mines. The debentures will be guaranteed by the three companies—Broken Hill South, North Broken Hill, and the Zinc Corporation, to whom the power is supplied.

Cables and Wireless.

Cables & Wireless stocks are heavy. The "A" ordinary has lost 3 points, at 17½, and the "B" stock ½, at 10. Moreover, it is easier to buy at the nominal prices than to sell. Anglo-American Telegraph preferred stock is ½ better at 103. Marconi Marines lost their last week's improvement, going back to 37s. 6d. Great Northerns continue dull at 29. Important schemes are germinating in Canada for the development of telegraph and wireless work. The idea is to form a Canadian External Communications Company, in which the Canadian Pacific Railway would be directly interested, and, with the money subscribed, to challenge competition with the American cable companies which at the present time secure a substantial slice of the Canadian business. Various difficulties are indicated as standing in the path of such a scheme, but the proposal is supported by powerful interests in this country and in Canada. In more normal times it would probably receive instant public attention. Canadian Marconi shares are a stagnant market at 12s. 6d. Automatic Telephones hold their gain at 37s. 6d., and International Automatics are 36s. 3d.

The Manufacturing Companies.

Further progress has been made in the upward direction by the shares of electrical manufacturing and equipment companies. Henleys are 3/16 up at 5 15/16. Enfields strengthened to 4 5/16; British Aluminium have recovered, after their sharp fall, to 28s. 6d. The lately-issued 5 per cent. debenture stock, which came out at 98½, has gone back to 2½ discount. Crompton Parkinson ordinary have gained 2s. at 23s. 3d., and rumour is talking of a possible resumption of negotiations which started some time ago, but failed to materialise into anything definite just then. Edison Swan 5 per cent. first debenture stock at 91½ is 2 points higher. Associated Electrical Industries ordinary at 22s., and G.E.C. ordinary at 45s., show no change. A further recovery in Babcock & Wilcox shares lifted the price to 47s. 6d. Vickers, on the other hand, are dull at 6s. 9d. English Electric ordinary have gone back to 8s. 9d., and the preference to 7s. 6d. India-Rubber Gutta-Percha 5 per cent. debenture is lower at 89. Ever-Ready shares keep close to 18s. 3d.

Dollar Stocks.

American Telephone & Telegraph, after its rise of 9 points last week to 196½, has gone back to 192½, and International Telephones at 26½ are a point lower. Brazilian Tractions are quiet at 24½. Shawinigan Water strengthened to 52, Power Corporation of Canada to 53. In the Mexican group, Mexican Light and Power second preference at 2¼ are a little better. Mexico Trams are quoted at 10. The 6 per cent. bonds at 17½ show a slight advance. American prices have been moving within narrow limits, and reports from the United States promote a feeling of caution in the minds of those who are interested in American utilities.

Amongst the sterling issues, Anglo-Argentine Tramways second preference have dropped to a nominal 12s. 6d., shares changing hands down to 5s. Calcutta Tramways ordinary are lower at 7s. 6d. Atlas Trust at a guinea are a few pence up. British Power & Light at 10s. 9d. remain neglected.

Share List of Electrical Companies.

HOME ELECTRICITY COMPANIES.

	Nom. £	Approx. Dividend. 1928.	1929.	Price Feb 3. 1931.	Rise or fall.	Yield p.c.
Bournemouth and Poole	1	15	15	3⅛	—	4 17 10
Brompton Ordinary	1	8½	8½	27/6	—	5 1 10
Central Electricity 4½% Deb. ...	Stock	—	—	95½	—½	4 14 6
Charing Cross Ordinary	1	8'	8½	29/-	—	4 16 7
Chelsea	1	8⅝	8⅝	27/6	—	5 1 10
City of London	1	10	10	36/3	—	5 10 3
Clyde Valley	1	8	8	34/6	—	4 12 9
County of London	1	7	10	48/9	—	4 2 0
Edmundsons' 7% Pref.	1	7	7	25/6	—	5 9 10
Elec. Supply Corporation	1	11	11	48/9	—	4 1 0
Kensington Ordinary	1	8	8	28/-	—	4 18 3
Lancs. Light and Power	1	7½	7	2 1/-	—6d.	6 1 9
London & Home Counties 4½% Deb.	Stock	—	—	95½	—½	4 14 6
London Electric	1	8½	9	32/6	—	5 10 9
Metropolitan	1	9	10	42/-	+9d.	4 15 3
Midland Counties	1	6½	7	28/6	—	4 18 3
Mid. Elec. Power	1	15	8	31/3	—	5 2 5
Newcastle-on-Tyne Ordinary ...	1	6	6	23/9	—	5 1 1
do. 7% Pref.	1	7	7	27/6	—	5 1 10
Notting Hill 6% Pref.	10	6	6	11¼	—	5 6 8
North Met. Elec. 6% Pref. ...	1	6	6	24/-	—	5 0 0
St. James' and Pall Mall	1	8	8	28/-	—	5 0 0
Scottish Power	1	8	8	30/-	—	5 6 8
South London	1	8½	8½	27/6	—	5 1 10
Urban Ordinary	1	7	7	29/6	—	4 15 0
Westminster Ordinary	1	8½	8½	29/-	—	4 16 7
Whitehall Elec. Invst. 7½% Pref....	1	7½	7½	25/6	—	5 17 8
Yorkshire Elec.	1	8	8	34/6	—	4 12 9

HOME RAILS.

Central London Ord. Assented ...	Stock	4	4	79	—	5 0 9
Metropolitan	,,	3½	4	60	—6½	5 16 8
do. District	,	4	5	77	—	6 9 10
Underground Electric	£1	7	8	23/6	—1/-	6 16 2
do. do. Income ...	Bonds	6	6	104	—	5 15 5

TELEGRAPHS AND TELEPHONES.

Anglo-Am. Tel. Pref.	Stock	6	6	103	+½	5 16 6
do. Def.	,,	1½	1½	25½	—	5 18 10
Automatic Telephone	1	10	12½	37/6	—	6 13 4
Cables & Wireless 5½% Pref. ...	Stock	—	5½	66½	—	8 5 4
do. A 7½% Ord.	,,	—	—	17½	—3	... ...
do. B Ord.	,,	—	—	10	—½	... ...
Globe Tel. and T. Ord.	10	10	10	12	—	8 6 8
do. do. Pref.	10	6	6	10½	—	5 17 1
Great Northern Tel.	10	20	20	29	—	6 18 0
Marconi-Marine	1	12½	15	57/6	—⅛	8 0 0
Oriental Telephone Ord.	1	12	12	2⅝	—	*5 1 1

HOME AND FOREIGN TRAMS, &c

Anglo-Arg. Trams First Pref. ...	5	5½	5½	1¼	—	... ...
do. do. 2nd Pref. ...	5	6	6	12/6	—½	... ...
do. do. 5% Deb. ...	Stock	5	5	38½	—	13 0 0
British Electric Traction Def. Ord.	,,	5	5	1375	—25	... ...
do. do. Pref. Ord.	,,		8	134½	—	5 19 0
Brazil Traction	100	7	8	21½	—	... ...
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	96½	—	5 3 7
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	11/6	—	... ...
London United Tram Deb. ...	Stock	4	4	60	+2½	6 13 4
Mexico Trams, 5% Bonds ...	—	5	5	54½	—	9 8 6
Mexican Light Common	100	Nil	Nil	47½	—	... ...
do. 7% Pref.	100	7	7	66½	—	10 10 0
do. 1st Bonds	—	5	5	80	—	6 5 0
Victoria Falls Ord.	1	15	15	58/9xd	—	5 2 0
Yorkshire (West Riding)		Nil	Nil	5/6	—	... ...

MANUFACTURING COMPANIES.

Assoc. Elec. Ord.	1	6	6	22/-	—	5 9 1
Babcock & Wilcox	1	13	15	47/6	+ 6d.	*6 6 4
British Aluminium Ord.	1	10	10	28/6	+1/6d.	7 0 4
British Insulated Ord.	1	15	15	3⅝	+⅛	4 10 7
Brush Ord.	Stock	10	10	105	—	9 10 6
Callenders	1	15	15	3⅜	—	4 16 1
do. 6½% Pref.	1	6½	6½	25/-	—	5 4 0
Crompton Parkinson Ord.	5/-	—	30	23/3	+2/-	6 9 0
do. 8% Pref.	1	8	8	27/6	+9d.	5 16 5
Edison-Swan 1st Pref.	1	7½	7½	23/9xd	—	6 6 4
do. 5% Deb.	Stock	5	5	94½	+2	5 5 10
Electric Construction	1	5½	5	12/-	—	8 6 8
Enfield Cable Ord.	1	20	25	4⅜	—	5 16 0
English Electric	1	Nil	Nil	10/-	—	... ...
do. do. Pref.	1	3	Nil	8/9	—	... ...
Ferranti Pref.	1	7	7	21/6	—	6 10 4
G.E.C. Pref.	1	6½	6½	25/6	—	5 2 0
do. Ord.	1	10	14	45/-	—	6 1 0
Henley	1	25	30	5⅞	+⅛	5 1 0
do. 4½% Pref.	5	4½	4½	4⅞	—	5 2 10
India-Rubber	1	Nil	Nil	6/8	—	... ...
Johnson & Phillips	1	10	10	36/9	—	5 8 10
Siemens Ord.	1	7½	7½	1⅛	—	7 1 2
Telegraph Construction	12	10	10	16½	—	*7 5 6

*Dividends paid free of Income Tax.

1931.

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Yield p.c.
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February 6th, 1931.

[*London*

' Dinner, Savoy Hotel, 1931.

The Electrical Contractors' Association.

Report of the Speeches at the Annual Dinner.

THE annual dinner of the Electrical Contractors' and Allied Associations took place at the Savoy Hotel, London, on January 28th. Over 300 members and guests attended, and the president, **Mr. H. C. Hazel,** occupied the chair. The gathering was thoroughly representative of the various branches of the electrical industry. The principal speaker was the **Rt. Hon. Herbert Morrison,** Minister of Transport, to whom fell the duty of proposing the toast of "The Allied Associations and Honorary Officials."

After a jesting reference to the immediate political situation, Mr. Morrison said that he had lately been living in an electrical atmosphere and he assured the contractors that it was entirely on their behalf that he had been urging the electricity supply industry to develop and expand. The industry was gradually beginning to understand that electricity supply which had grown up largely on a local basis must now be welded into a national standardised whole. Standardisation would bring immense benefits to the contractor, the manufacturer and the public, and would also assist manufacturers in competing for overseas trade. Already the Central Electricity Board had placed £18,000,000 worth of contracts; in the next ten years it would be called upon to find 4¼ million kW of new and substituted plant and to erect 2,000 miles of 132,000-kV lines. The co-ordination of generation and main transmission was proceeding, but a greater problem was to standardise distribution by 660 authorities with varying views and practices. He maintained that the industry was in a position to take commercial risks, even to the extent of laying mains in what appeared to be barren districts. The would-be consumer must find the mains already laid instead of having to go down on his bended knee for a supply. Electricity supply must be a service and the quarterly bill should be made as low as possible to encourage still further use. The experience of the last year or two was that the growth of the domestic load had compensated for the loss of the industrial load through trade depression. Despite all that had been done, only the fringe of the domestic demand had been touched. One grave fault in the industry was the existence of company directors and committee-men who did not believe in the thing that they were selling. He suggested that no one should be a director of a supply company or a member of an electricity committee unless he had proved by example that he believed in electricity. He repeated that reasonably low prices and attractive two-part tariffs were essential. Also, the price of apparatus was too high for the working classes and for many of the middle classes; that difficulty could only be surmounted by the institution of hire-purchase schemes. Although steady progress was being made—there was an increase of 12 per cent. during 1929-30 in the number of consumers connected—this could easily be accelerated if all sections co-operated and felt a joint responsibility for the progress of the industry. In conclusion Mr. Morrison referred to the great amount of hard work which the honorary officers of such an association devoted to the interests of their fellow members.

In responding to the toast, **Mr. Hazel** hailed Mr. Morrison as the political head of the electrical industry and referred to the presence of Sir Hugo Hirst, Bt., whom he characterised as a great industrial leader. He extended the Association's best wishes to Mr. Alexander Cramb, the new director and secretary of E.D.A. Mr. Hazel considered that the principal problem with which the industry was confronted was the increasing of the public confidence in, and use of, the efficient and flexible commodity with which it dealt. If they succeeded in this, many of the other problems would solve themselves; the Grid would be loaded, manufacturers would increase their output, and contractors would obtain an adequate amount of installation work. Could they be satisfied with the progress which was being made? Although much had been done towards the standardisation of systems and prices, undertakings with frequency variations were still being extended and consolidated. Although in many districts reasonable tariffs assisted those engaged in the industry, unreasonable tariffs were still too often found in residential areas. Some authorities persistently refused to lay mains until a demand was absolutely guaranteed, although in many cases the demand would follow very quickly, and even where a potential load existed they would not always provide mains. It was agreed that assisted-wiring schemes were essential to the promotion of the general use of electricity, but there was no standardisation in this respect. The technical features of a system were approved in one district and denounced in another. A standard national assisted-wiring specification would lead to simplification and economy. A national minimum wiring code was very necessary but supply engineers were reluctant to adopt such a code. Engineers all over the country were making all sorts of conflicting regulations which had no force in law when they might have a national code with penalties for delinquencies. The electrical education of the public had been little more than commenced. Electrical traders' shops and showrooms were invaluable, but something more direct and tangible was required if real progress was to be made. He urged the industry, with the assistance of E.D.A. to establish a "Central Bureau of Electrical Service," properly equipped and staffed. The many applications of electricity must be taught, explained and demonstrated. The process must be started in the schools and training establishments. The contractors had to assist in loading the Grid promptly and efficiently and in doing so they would load themselves with work.

Sir Duncan Watson in a humorous speech proposed the health of the guests, saying that he had never been in such a gathering of representatives of prosperous organisations. He drew attention to the fact that every penny which the Board had spent was spent with British manufacturers. The latter had not only been successful at home but had made good headway in overseas markets. He considered that the electrical contractors were in the most difficult position in the industry owing to the fierce competition of price-cutters. They were entitled to fair remuneration and the absence of this would militate against sound work. Inferior contractors were a weak link in the chain of electrical organisation and must be removed.

Sir Hugo Hirst replied to the toast. He said that he was not depressed because things looked bad. He would not deal with the causes of the present depression—the Press, the bankers and the economists did that. His object was to find means to restore normal conditions. In a recent *Ministry of Labour Gazette*, lists were given of the state of employment in various industries. From these it was seen that 60 or 70 industries, of the newer type, showed that they were employing from 20 to 70 per cent. more people than in 1924. The older industries showed decreases, which was only to be expected, but altogether there were now 250,000 more people employed than in 1924 and production had increased to a similar extent. This country was not decadent; it was doing more in the present world depression than any other country. The total number of unemployed was stated to be about 2,600,000, but if only the genuine cases were given benefit that number could be reduced by a million. Taking the uninsured occupations into account unemployment amounted to about 12 per cent. This was a considerable proportion but industrialists were accustomed to having such a proportion of their equipment unproductive. It should be possible to increase business by 10 per cent. and thus solve the problem. We might wait in vain for legislation but something could be done to secure that increase. He had given it as his opinion at the end of the war that just as steam had saved the country after the Napoleonic wars so would electricity come to the country's rescue to-day. The cheap electrical unit was very near. The grid had to be loaded and the industry must realise that this could not be done by past methods—some further effort was necessary. Those in the industry knew what electricity could do and they thought the public ought to know. The public did not know and had to be educated by many methods. Catalogues and shop windows were not enough and something bigger than E.D.A. was needed. He would like to see a great co-operative movement by the industry leading to the establishment of three or four "Electric Demonstration Palaces" in different parts of the country, showing everything electrical in working order for rich and poor alike. Referring to the industrial scope, Sir Hugo said that every industry could be reorganised and improved by electrification but it was wrong to wait until industry asked for electricity. Electrical engineers must study each industry thoroughly with those in it to discover how electrification could best be carried out.

Alderman E. Huntsman, who also replied to the toast, compared himself with Sir Hugo Hirst in a self-deprecatory manner and said that E.D.A.'s views should really have been voiced by Lt.-Col. Vignoles or Mr. Cramb. He had attended many dinners during the past year or two at which he had heard expressions of despair not at all in accordance with the prosperous appearance of the speakers; he had even heard electrical contractors give vent to such expressions! He was therefore glad to hear the note of confidence which had rightly been sounded by each speaker at the dinner. The industry had a great future of service before it. One thing was certainly necessary—the education of the public as distinguished from mere advertisement; that was no small task.

In felicitous terms the President's health was proposed by **Mr. R. Harrison-Watson,** secretary of the Liverpool branch of the E.C.A., of which branch, the speaker said, Mr. Hazel was secretary for seven years and subsequently chairman for eight years. **Mr. Hazel** briefly replied.

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The Electrical

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The Argentine Electrical Market.

A Fresh Opportunity.

ALMOST on the eve of the departure to Buenos Aires, for the British Empire Trade Exhibition, of a number of leading representatives of the electrical and other engineering industries of Great Britain, the Department of Overseas Trade has issued a report by Mr. H. O. Chalkley, Commercial Counsellor at Buenos Aires, on economic conditions in the Argentine Republic up to October 31st, 1930.

One turns first to the section dealing with the market for electrical machinery and appliances which, as Mr. Chalkley rightly remarks, has to be considered in relation to the control of light and power undertakings. Unfortunately it cannot be said that British influence is very great in the four power groups. The two principal ones are the Electric Bond & Share Company of the United States, working through the American Foreign Power Company, with its associations in England and Germany, and the Cia. Hispano Americana de Electricidad (C.H.A.D.E.) controlled by the important financial entity "Sofina" with headquarters at Brussels. The other two are the Cia. Sudamericana de Servicios Publicos, an offshoot of the American Westinghouse group, and the Cia. Italo Argentina de Electricidad (C.I.A.E.), which shares with the C.H.A.D.E. the supply of power and light in Buenos Aires. Although British manufacturers have so far had a fair share of orders for heavy plant from all these, Mr. Chalkley remarks significantly that their future policy and its effect on orders for the British electrical industry are not yet defined. He expresses the hope that if these undertakings decide to purchase on a commercial basis they will continue to find that they can obtain first-class manufactures from Great Britain under better conditions than elsewhere. Similar considerations apply to the telephone company of Buenos Aires, which has now passed from British to American control.

Electricity Supply and Electrical Imports.

During the past year the Compañia Italo Argentina de Electricidad has proceeded actively with the construction of its large new station alongside that of the Compañia Hispano Americana de Electricidad. American capital has continued to show interest in the purchase of power plants throughout the country, among recent transfers being the plant at Mendoza which supplies light and power to the city and whole of the province of Mendoza. The consumption of electricity has increased considerably, the quantity generated by the two principal companies serving the city of Buenos Aires and its suburbs during the years 1928 and 1929 being as follows:

(In millions of kilowatt-hours.)

	C.H.A.D.E.		C.I.A.E.	
	1928	1929	1928	1929
Public lighting	28.4	31.6	14.0	16.0
Private lighting ...	198.3	208.2	54.5	62.0
Power and traction ...	398.8	445.0	57.8	66.0
Total	625.5	684.8	126.3	144.0

An appendix to the report gives the total quantities of the principal imports for 1928 and 1929, together with the figures of the share of the chief participating countries. Not many classes of electrical goods are specified in this appendix. There has, however, since been issued by the Argentine Customs a return giving a large number of electrical items. It is therefore proposed in an early issue to print a comparative statement combining the information available from the two sources. Meanwhile Mr. Chalkley's general remarks regarding the British share of the electrical trade may be summarised.

German and American Competition.

In transport undertakings, which are still under British control, British equipment is still well ahead of other, and even in the recently-opened Lacroze underground railway, of which the control is non-British, all the electrical rolling stock was supplied by British firms. Heavy plant ordered by Government Departments in price competition on local specifications has been almost invariably German or American. Similarly the Americans and Germans have the lead in the merchandising trade in electrical goods and appliances, and it is said that no new manufacturer can obtain a footing in the market without expense. Apparently one reason is the same as that which has handicapped British manufacturers in the Canadian market, viz., the need for adaptation. It is satisfactory to learn, however, that in small industrial electric motors British manufacturers are making considerable efforts to increase their business in the face of German and Italian competition, by cutting prices and paying more attention to "servicing."

With regard to electric lighting sets, the electrical part of the equipment provides the stumbling-block to increased sales for British manufacturers. Generators, switchgear and batteries of German, Swiss, Belgian and Scandinavian make can undersell the British products, and often British suppliers of complete sets must include apparatus of foreign manufacture in order to secure the business. The report states that while the demand for lighting sets is undoubtedly being affected by the extension of electric power services, it still exists strongly in the more remote country districts.

From Mr. Chalkley's brief review of the progress of broadcasting and the market for radio apparatus, it is clear that the strongest competition which has to be met is that from the American makers, who advertise their products well and give service after purchase. Highly-selective sets are required and the demand is at present limited to those for local work, the number of persons interested in short-wave reception from the United States and Europe being negligible. It is, however, made evident that the market has great possibilities of expansion.

In his survey of the considerable developments which have been made by the United River Plate Telephone Company, Mr. Chalkley comments on the very large amount of equipment which has been supplied from Great Britain. Similarly the new equipment for the radio-telephone stations in Buenos Aires, to work directly with stations in England, are British made.

Advertising and Merchanting.

With regard to advertising generally, it is said that the only way to carry out a local scheme effectively is to employ one of the advertising agents established in Argentina who are in a position to draw up publicity matter in accordance with Argentine tastes. It is still found desirable to call attention to the necessity for producing catalogues in Spanish, as currently used in South American countries. Locally-established agents or merchant firms are the medium recommended for tendering for and negotiating Government contracts, which include many for machinery and equipment.

In a chapter on marketing organisation and local representation, Mr. Chalkley discusses very fully the relative merits for different branches of trade of direct selling and merchanting. The methods of direct representation in the Republic are not simple or standardised. In addition to the foreign branch or branch company carrying stocks and selling in competition with other importers, there are the foreign branch offices or whole-time representatives who do not sell in competition with importers but through them, or a selected number of them; the technical rather than commercial representative of the factory attached to an agent merchant house; the local merchant firm which has the sole agency and distribution rights; the export sales corporation—developed more by the Americans and Germans than by the British; the division of one firm's agencies for its different classes of products among two or more firms; the local representative working on salary and commission in varying proportions who represents either a limited group of non-competitive firms or has complete liberty to accept any competitive or non-competitive representations he sees fit; the visiting commercial traveller associated or not with any one of these firms; and the purely nominal representative (on commission only) whose representation is not much more than a catalogue and a name in an extensive list.

Of these, apart from the branch, which is the solution accessible to the very few, the best form for Argentina is a specialised whole-time representative on salary and commission and the least satisfactory is the multiple agency where a great number of products of all kinds are handled by one agent.

Joint Selling Organisations.

The chapter on the formation of joint selling organisations is of special interest in view of the recommendations on this subject recently made by the Sheffield Trade Mission to South America. While Argentina is considered as possibly the best foreign market for experiment, the opinion is expressed that attempts there have not succeeded because it has been assumed that the initiative must be taken by, or on behalf of, the manufacturers in Great Britain. Experience tends to show that, except as a consequence of rationalisation or output association, such combination comes better if the initiative is taken by a well-established and competent local agent. Mr. Chalkley is evidently sincerely anxious that this problem should be tackled seriously. He alludes to the case of manufacturers, who from the nature of their products, the limits of their possible turnover and of their available financial resources, rightly refrain from any attempt at direct trade and rely on such business as they can obtain through merchants. In order that this case, and similar cases, may be satisfactorily met, Mr. Chalkley suggests that there is an opportunity for merchants to evolve a new system, which would entail their exclusive association with a selected group of manufacturers, in place of the system of dealing where they see fit and find the lowest prices.

Mr. Chalkley says, and he is well placed to know, that merchants in recent years have found it practically impossible to secure fully-qualified, active and competent agents in Buenos Aires. The position would, however, be entirely different if the merchant could offer to a prospective agent the exclusive and direct agencies of a group of manufacturers for whose export business the merchant would provide the finance.

British Engineers in Argentina.

In view of the visit of the British engineering delegation to Buenos Aires, Mr. Chalkley takes the opportunity of calling attention to the strength of the British engineering profession in Argentina and the facilities, far superior to those enjoyed by competitors, for making professional and technical contacts with local engineering in all its branches. He mentions first the Centre of British Engineering and Transport Institutions which since 1928 has provided common permanent headquarters and a general secretary for seven British engineering institutions, including the Institution of Electrical Engineers, which, however, continue to retain their separate identity. The total membership in Argentina of the seven institutions comprised in the Centre is 866 but, since there are members who belong to two or more of the institutions, the actual membership of the Centre may be put at 800. The object of this Centre is to unite in one body the members of these institutions for mutual support, to provide facilities for the reading of technical papers and visits to works and other local engineering undertakings, and to maintain an extensive technical library and a reading room with the current numbers of British technical magazines. The Argentine Local Centre of the Institution of Electrical Engineers has a membership of 63.

Electrical Imports of Spain.

Statistics for 1928 and 1929 Compared.

THE following figures, showing the imports of electrical goods into Spain in 1929 are taken from the recently issued trade statistics. The totals for 1928 are given for purposes of comparison, and notes of increases or decreases added.

It will be seen that there were decreases in the imports of all the principal classes of goods, with the exception of wires and cables, and telegraph and telephone material. In the former class, Great Britain was the leading supplier but in most other groups Germany has been exceptional in increasing her trade. The present prospects for the import trade are clouded by political unrest, financial stringency and plans for local manufacture under tariff protection.

	1928. 100 kg.	1929. 100 kg.	Inc. or dec
Dynamos, motors, transformers, switchgear, &c.—			
Total	69,670	54,070	−15,600
From Germany	13,510	16,330	+ 2,820
,, United States	11,950	5,665	− 6,285
,, France	9,630	6,370	− 3,260
,, Great Britain	5,440	6,900	+ 1,460
,, Sweden	3,480	4,320	+ 840
,, Belgium	870	1,430	+ 560
,, Switzerland	21,650	10,840	−10,810
,, Italy	570	320	− 250
,, Holland	1,000	660	− 340
Self-contained generating sets—			
Total	6,900	3,324	− 3,576
From Germany	700	810	+ 110
,, France	3,910	950	− 2,960
,, Great Britain	350	660	+ 310
,, United States	440	500	+ 60
,, Switzerland	1,132	310	− 822
Switchboards—			
Total	1,670	1,030	− 640
From Germany	280	400	+ 120
,, United States	245	190	− 55
,, France	610	160	− 450
,, Great Britain	150	140	− 10
Electrical fittings (switches, lampholders, &c).—			
Total	19,010	11,000	− 8,010
From United States	2,730	1,120	− 1,610
,, Germany	2,890	3,460	+ 570
,, Great Britain	2,170	640	− 1,530
,, Belgium	3,500	1,980	− 1,520
Electrical measuring instruments and parts thereof—			
Total	1,810	1,570	− 240
From Germany	830	830	—
,, France	186	120	− 66
,, Switzerland	696	498	− 198
,, Great Britain	26	39	+ 13
Stoves, heaters, cookers, irons, &c.—			
Total	1,160	1,020	− 140
From Germany	410	500	+ 90
,, Switzerland	550	300	− 250
Accumulators, dry batteries, and parts—			
Total	7,930	7,600	− 330
From Denmark	1,330	1,160	− 170
,, Germany	1,860	1,745	− 115
,, Great Britain	640	420	− 220
,, United States	1,510	1,530	+ 20
,, France	2,460	1,890	− 570
,, Sweden	130	350	+ 220
Wires and cables—			
Total	14,980	30,560	+15,580
From Great Britain	3,420	20,540	+17,120
,, Germany	3,670	5,590	+ 1,920
,, France	3,110	1,250	− 1,860
,, United States	905	2,290	+ 1,385
Incandescent electric lamps—			
Total	1,620	483	− 1,137
From Holland	483	136	− 347
,, Great Britain	7	2	− 5
,, France	246	34	− 212
,, Hungary	*	46	—
Telegraph and telephone switchboards and apparatus—			
Total	3,120	3,920	+ 800
From France	320	425	+ 105
,, Belgium	1,324	510	− 814
,, Germany	210	580	+ 370
,, Great Britain	450	280	− 170
,, United States	600	900	+ 300
,, Sweden	230	110	− 120
Wireless valves—			
Total	15	86	+ 71
From Germany	5	5	—
,, United States	5	10	+ 5
,, France	1	13	+ 12
,, Holland	8	55	+ 47
Electric mercury vapour lamps, searchlights, &c.—			
Total	166	222	+ 56
From United States	—	67	+ 67
,, France	3	8	+ 5
,, Germany	156	107	− 49
Carbons, other electrodes, &c.—			
Total	6,400	5,465	− 935
From United States	2,915	2,765	− 150
,, Great Britain	510	186	− 324
,, Germany	1,063	980	− 83
,, France	1,380	186	− 1,194
Insulating tapes, fabrics, and tubes—			
Total	3,850	2,520	− 1,330
From United States	3,150	2,100	− 1,050
,, Germany	490	350	− 140
,, Great Britain	10	—	− 10

* Not specified.

Irish Free State Electrical Imports.

A quiet state of affairs again prevailed during November last in the importation of electrical machinery, apparatus, and cognate goods into the Irish Free State, the month's total being £46,503, as compared with £76,878 in November, 1929. The subjoined table gives the imports during the first eleven months of the past two years.

	January to November. 1929.	1930.
	£	£
Electrical machinery	285,558	269,445
Electric wires and cables	187,227	152,257
Electric lamps and parts	84,051	82,500
Wireless sets and parts	80,945	88,449
Other electrical goods	216,632	195,934
Copper wire	84,433	44,979
Totals	£938,846	£833,564

It will be seen that there was a decline of £105,287 in the gross imports, the only item showing an increase being radio apparatus.

Emergency Lighting.

"Katholite" Equipment and Methods of Application.

PUBLIC authorities impose stringent regulations relative to the provision of secondary, or stand-by, systems of illumination in places of public amusement. They demand that a certain number of lamps shall be kept alight in exits and gangways whilst the public is in occupation of the building, and that the source of such emergency light must be independent of the main supply. Whilst differing in detail, the principal requirement is that the stand-by system shall come into operation with absolute certainty on the failure of the main source. Therefore some authorities dislike a system which depends on the functioning of a delicate automatic switch, but in many instances (for example, banks, hospitals, institutions, &c.) semi-automatic or hand-operated equipment is quite permissible.

Accordingly the D.P. Battery Co., Ltd., has prepared a series of emergency-lighting schemes to fulfil most requirements and comply with local authorities' rules, which may be classified as follows:—

In Group I four schemes are suitable for places of public amusement.

Scheme (i).—All lighting circuits are supplied from private generating plant (say crude-oil-engine driven) operating in conjunction with a battery as outlined in fig. 1. This method is simple and direct, and complies with all regulations on the subject.

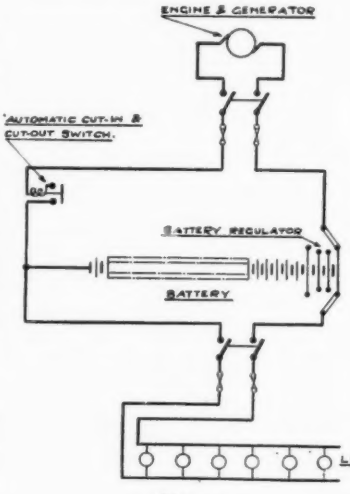


Fig. 1.

Scheme (ii).—The main circuit is fed from the public mains (see fig. 2) and the emergency circuits from a battery, which must be fully charged every day by means of either a motor-generator or an independent engine and dynamo set. In the case of kinemas, theatres, and other places of public entertainment, the battery must be charged, according to the regulations, before the public is admitted and its capacity must be equal to supplying the safety lighting load for the number of hours required by the particular by-law concerned, varying from 4 to 12 hours.

Scheme (iii).—The main circuits are supplied from outside, but the safety lighting is connected to a motor-generator running off the mains with a battery "floating" across it as shown in fig. 3. This method permits the use of a battery of smaller capacity and has been approved by the leading authorities in the London area. It must be noted, however, that this method is subject to a certain restriction on the part of some of the authorities concerned, namely, that in the event of a main-supply failure the public shall be turned out of the building. The permitted capacity of the battery is variable; some authorities demand a two hours' supply, some three hours, and some five hours. The d.p. main charging switch is interlocked with the d.p. switch in the "safety" circuit, so that the former may be closed for charging purposes when the latter is open, but the latter cannot be closed without first closing the former. An indicating device makes the responsible person aware that the safety plant is functioning.

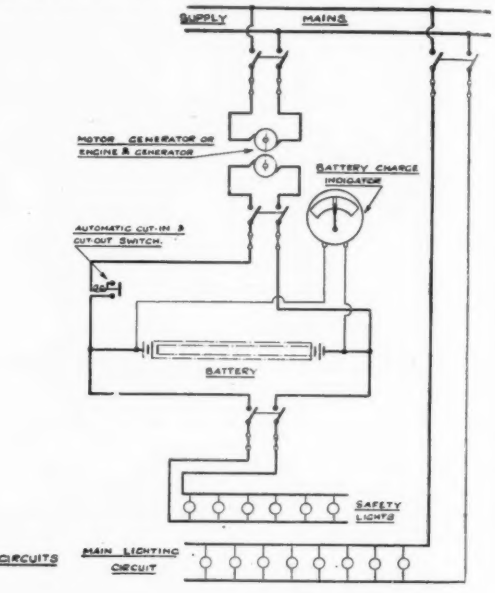


Fig. 2.

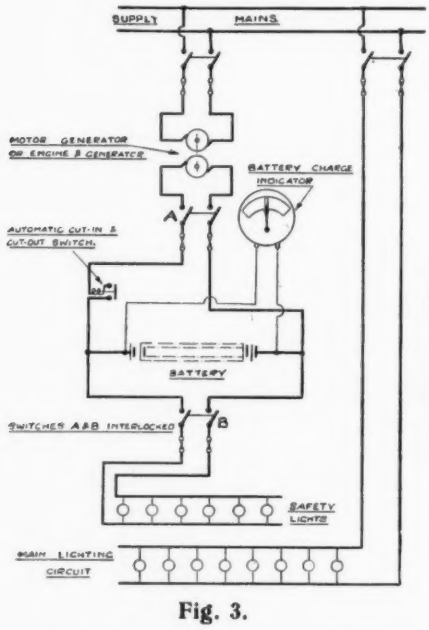


Fig. 3.

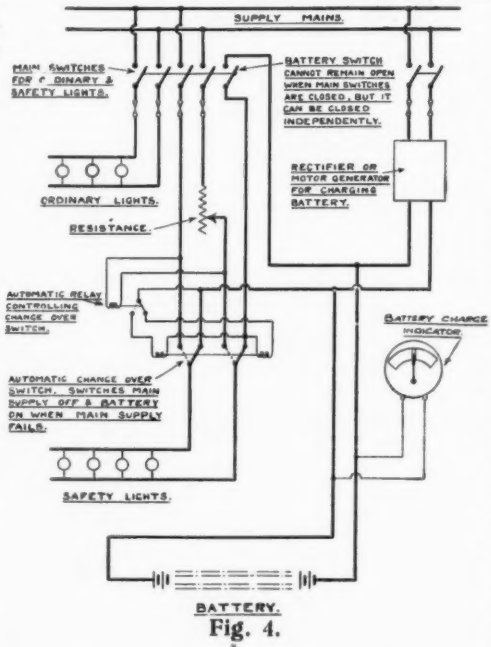

SUPPLY MAINS
MAIN SWITCHES FOR ORDINARY & SAFETY LIGHTS.
BATTERY SWITCH CANNOT REMAIN OPEN WHEN MAIN SWITCHES ARE CLOSED, BUT IT CAN BE CLOSED INDEPENDENTLY.
RECTIFIER OR MOTOR GENERATOR FOR CHARGING BATTERY.
ORDINARY LIGHTS.
RESISTANCE.
AUTOMATIC RELAY CONTROLLING CHANGE OVER SWITCH.
BATTERY CHARGE INDICATOR
AUTOMATIC CHANGE OVER SWITCH. SWITCHES MAIN SUPPLY OFF & BATTERY ON WHEN MAIN SUPPLY FAILS.
SAFETY LIGHTS.
BATTERY.

Fig. 4.

Scheme (iv).—Both the main and safety circuits are fed direct from an outside source, the latter being of lower voltage and fed through a resistance (fig. 4), and in the event of the failure of the outside source a contactor switch puts the safety lights on to a battery. This is a modification of scheme (iii), but it permits a smaller motor-generator to be used, as it is called upon to charge the battery only after an emergency demand. Operation depends upon a contactor switch of special design provided by the D.P. Battery Co., which automatically functions when the main supply fails.

In Group II two schemes are suitable for installations other than in places of public amusement.

Scheme (v).—The main and safety circuits are fed (fig. 5) from outside, but the latter are automatically switched on to a portable battery by means of the special d.p. contactor switch. This modification of scheme (iv) is useful when one or two safety lamps only are required; a low-voltage battery, easily handled, can, if necessary, be charged elsewhere and plugged in when wanted.

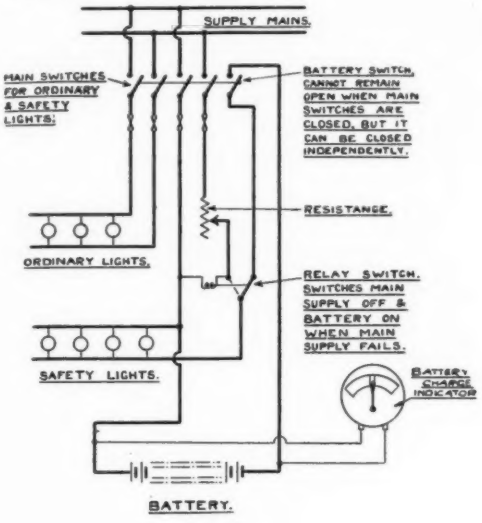

SUPPLY MAINS.
MAIN SWITCHES FOR ORDINARY & SAFETY LIGHTS.
BATTERY SWITCH, CANNOT REMAIN OPEN WHEN MAIN SWITCHES ARE CLOSED, BUT IT CAN BE CLOSED INDEPENDENTLY.
RESISTANCE.
ORDINARY LIGHTS.
RELAY SWITCH. SWITCHES MAIN SUPPLY OFF & BATTERY ON WHEN MAIN SUPPLY FAILS.
SAFETY LIGHTS.
BATTERY CHARGE INDICATOR
BATTERY.

Fig. 5.

Scheme (vi).—This is a non-automatic method of a simple, but unique, form. The safety lamps are connected to an independent battery, but in order that the switches controlling them can be immediately located small pilot lamps are situated so as to illuminate them. The pilot lamps are connected (fig. 6) to the main lighting switch and so are always alight when the main switch is closed, but are actually fed by the battery. In the event of the main supply failing the pilot lamps will provide sufficient illumination to prevent confusion, but their main object is to indicate the positions of the high-power emergency lamps, which can then be switched on by hand, as required. The emergency circuit is completely separate from the mains installation, so that whether the interruption arises from a failure of the supply company's mains, or is due to a fault on the premises, the emergency circuit is not affected. The battery is kept continuously charged from the mains by means of a trickle charger set slightly above what is necessary to supply the pilot lamps, so that the cells are always full.

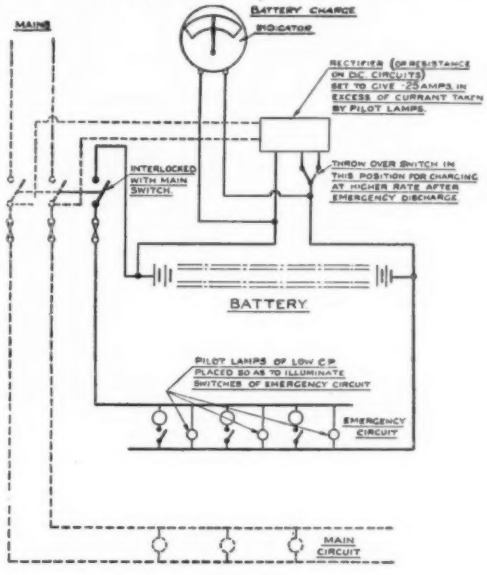

MAINS
BATTERY CHARGE INDICATOR
RECTIFIER (OR RESISTANCE ON D.C. CIRCUITS) SET TO GIVE 2·5 AMPS. IN EXCESS OF CURRANT TAKEN BY PILOT LAMPS.
INTERLOCKED WITH MAIN SWITCH.
THROW OVER SWITCH IN THIS POSITION FOR CHARGING AT HIGHER RATE AFTER EMERGENCY DISCHARGE
BATTERY
PILOT LAMPS OF LOW C.P. PLACED SO AS TO ILLUMINATE SWITCHES OF EMERGENCY CIRCUIT
EMERGENCY CIRCUIT
MAIN CIRCUIT

Fig. 6.

Mr. Morrison at Leeds.

North-Eastern supply authorities urged to speed up development.

IN our last issue we gave an account of a series of conferences held in Glasgow, Manchester and London in connection with Mr. Herbert Morrison's scheme for speeding up electrical development throughout the country. A further conference was held on January 16th at Leeds, at which the Lord Mayor of Leeds, Dr. A. Hawkyard, presided over nearly 200 representatives from the undertakings of the North-East and Mid-East England electricity areas. Some 98 undertakings are included in these areas.

Opening the discussion which followed Mr. Morrison's address, **Alderman J. W. Longley,** chairman of the Bradford Electricity Committee, referred to Mr. Morrison's plea that electricity undertakings should hasten the change-over from d.c. to a.c., and said that Bradford had already spent £112,000 in this connection and would require to spend a further £500,000 to complete the scheme. He did not think he would be justified in asking the Bradford Committee even to contemplate changing over the whole of its streets within the next two or three years, at any rate.

Mr. W. B. Woodhouse, speaking on behalf of the undertakings identified with the Association of Electric Power Companies and the Provincial Electric Supply Association, said that the present time was one when raw materials were low in price and when everything possible should be done to increase the efficiency of the undertakings. Electricity undertakings must do their part in assisting to encourage new industries in the area as well as helping existing industries by cheap and plentiful supplies of electricity. The problem of rates and taxes was one of considerable gravity. A very large part of the working costs of an undertaking was on account of local rates, and if an abatement was granted such as was given to industrial hereditaments under the Rating and Valuation Act, 1928, he thought that it would probably be possible to reduce the price of electricity to industrial consumers by 5 per cent. Mr. Woodhouse urged that local authorities generally could utilise the public electricity supply in greater degree in connection with their street lighting, waterworks, sewage and other undertakings; and suggested that it was a serious state of affairs that practically 60 per cent. of the electrical requirements of the country's mines were met by private plants.

Mr. Thomas Roles, city electrical engineer of Bradford, speaking on behalf of the Council of the Incorporated Municipal Electrical Association, said that complaints had been received from local authority undertakings which would receive bulk supplies under the Central Board scheme that the charges in respect of new and extended contracts, were being generally increased. Municipal electrical undertakings in the Yorkshire area were also rather apprehensive as to the future level of coal costs, and it was feared that the new Coal Mines Bill would be likely to increase the costs to the Bradford undertaking by from £8,000 to £10,000 per annum. Another cause for anxiety among local authority undertakings was that of the Commissioners' charges, and it would be desirable if they could at least have some idea on which to estimate these charges year by year.

Mr. Morrison, replying to the discussion, said that, whilst he felt every sympathy with public utility undertakings in their burden of rates, he was afraid he saw little prospect of their being granted the abatement under the De-rating Act, at any rate for the present. The matter raised very deep questions of finance which were not within his province, but, personally, he agreed that the position seemed very unfair. With regard to the apprehension voiced by Mr. Roles, Mr. Morrison said he was by no means convinced that the new Coal Mines Act was going to increase the cost of coal, but if there was any industry in this country which needed putting on a sounder basis he thought it must be generally agreed that the coal industry was that industry. To his mind, the position of the electricity industry demanded very careful attention to the matter of undue use of electricity profits in relief of rates; that money would have been very useful if put back into the undertaking. With regard to the question whether the grid scheme was going to increase costs to districts taking bulk supplies, Mr. Morrison thought that this was a matter to be discussed with the Central Electricity Board and the Commissioners rather than himself, but generally speaking, he said, where the existing undertaking went out of existence he did not see that the community would be any worse off.

Overhead-line Regulations.

Some proposed amendments of the Electricity Commissioners' rules as suggested by erection experience since they were issued in 1928.

(Report of discussions before the OVERHEAD LINES ASSOCIATION.)

AT the December meeting of the Overhead Lines Association in London a discussion commenced upon the Overhead-line Regulations of the Electricity Commissioners with the object of placing before the Commissioners certain suggested modifications having regard to the experience gained since the Regulations were issued in April, 1928.

Mr. W. Fennell, chairman, in opening the meeting recalled the revision, in 1928, of the Regulations (El.C.53) and suggested that the time was ripe for amendments, as a considerable amount of money was being wasted through supply authorities being compelled to comply with them, which was having the effect of restricting supplies to the more densely populated of the rural districts. He claimed that, owing to the work of the Overhead Lines Association, engineers dealing with distribution by means of overhead lines could be trusted not to do their work in a manner which would be dangerous and, at the same time, contended that it was now possible to do certain things which the Commissioners were not confident about in 1928. His own view was that, in certain respects, the Regulations were too severe for British climatic conditions.

The Regulations were dealt with seriatim :—

Regulation 1, "Materials for Line Conductors"—although according to the memorandum accompanying the Regulations "other materials" than those specified therein would be, and had been, approved by the Commissioners, the time had come when they should specify those "other materials," or such of them as they had experience of. Such things as copper-clad steel, pre-formed steel with a copper core, cadmium-copper, and straight combinations of metals, should now be included in the Regulation, the object being to avoid the delay involved in obtaining consent to their use.

Mr. R. Borlase Matthews seconded the resolution, which was carried, it being stated that in putting forward its final proposals the Council of the Association would only include well-known materials, not the doubtful alloys.

Regulation 3, "Minimum Size of Line Conductors"—the chairman suggested that not less than No. 8 wire should be used for main lines and not less than No. 10 wire for services. He saw no reason for the elaboration now contained in the Regulation.

Mr. S. G. Bartholomew pointed out that the Regulations were for the safety of the public.

Various views were expressed on this matter, and it was decided to take no action with regard to it.

Regulation 4, "Line Conductors to be Inaccessible"—it was agreed to ask that paragraph (*a*) be deleted; in other words, that the undertakers be called upon to make provision to prevent danger.

Regulation 5, "Lines Crossing Other Lines"—was discussed at some length. The chairman pointed out that it involved the second-comer question and reminded the meeting that the Post Office had agreed that when it was the second-comer it would take the necessary steps to prevent damage from contact with an existing line; he claimed that that principle should be applied in every case, apart from the Post Office.

During the discussion doubts were expressed whether the Electricity Commissioners had any power to make such a Regulation, which would apply to others than statutory supply authorities. It was said, for instance, that it could not apply to a private individual erecting a private telephone line.

Mr. S. G. Bartholomew remarked that, although the Post Office had agreed to the second-comer condition, it had not given way on the legal aspect of the matter. The point as between telephone and power lines was that the latter were dangerous and, therefore, the people who erected them should be compelled to take precautions to prevent damage, whether they were first or second comers. All-round application of the second-comer clause would prevent wireless aerials being put up in many cases near already existing power lines.

Eventually it was agreed to suggest to the Commissioners that, if they could not alter the Regulation to make the second-comer in all cases provide against danger to existing lines, a clause to that effect should be inserted in the next Electricity Bill to be promoted.

Regulation 6, "Supports"—should be amended to permit of other materials than those specified being used, so long as the factors of safety were maintained. As things stood it forced the purchase of foreign timber. The Commissioners were willing to consent to the use of wooden poles other than red fir, provided suitable precautions were taken in the felling, selection, and treatment of the timber. If the words of the memorandum were embodied in the Regulation it would not be incumbent upon a supply authority to ask for special consent in every case. A resolution to that effect was carried with one dissentient vote.

Regulation 7, "Factor of Safety of Supports"—it was decided to urge the Commissioners not to ask for the erection of wooden poles that would not move in the ground, owing to the great difficulty of complying with such a requirement.

Regulation 8, "Service Lines"—it was also decided to ask the Commissioners to insert the statement already contained in the memorandum accompanying the Regulation, *viz.*, that all live conductors should be covered with durable insulating material for so much of their length as lay within 6 ft. of any building.

Regulation 12, "Factor of Safety of Line Conductors"—after a long discussion no decision was come to. As it at present stood lines for supplying rural areas at high voltage were treated on the same basis as the main grid lines, which was an unfair handicap on rural supplies.

Consideration of the Regulations was continued at the January meeting of the Association.

Mr. W. C. Bexon (president), referring to Regulation 5, "Line Conductors Crossing Other Lines," said the Central Electricity Board had been very busy in Ayrshire and had crossed the Ayrshire Board's power lines about 12 times with its 132,000-volt lines, but apparently it had not fulfilled Regulation 5. If it was not necessary for the Central Board to comply strictly with that Regulation, he failed to see why an ordinary undertaking should not be allowed to do likewise. The 132,000-volt lines crossed the Ayrshire Board's lines without any guarding, which suggested that the C.E. Board did not consider Regulation 5 of much use; therefore, the Commissioners should be asked to delete the Regulation altogether.

Regulation 8, "Service Lines," he had found absolutely impossible to work to. In the case of supply to a number of houses close together the owner of one house might, perhaps, refuse to give permission for the line to be run over his garden, which would make it necessary either to lay an underground cable or to erect a separate pole outside every house, with the result that the whole street would be filled with poles. According to the Commissioners, nothing could be done to modify that position, but it would be easy to run a catenary wire and carry the service line from that.

MR. W. FENNELL said it seemed to him that the use of a catenary wire in the manner indicated would comply with the Regulations.

Mr. Grimmitt (Electricity Commissioners) said it would be permissible to take the service line to the point of support, run it along the catenary, and take it off at right angles. With regard to Regulation 5, because the C.E.B. ran its wires across other lines without any apparent precautions, it must not be assumed that nothing had been done. The point was that the C.E.B. lines were constructed to a much greater factor of safety than was called for in the Regulations for other lines.

Mr. Jocelyn Swan mentioned that Mr. W. A. Turnbull (Aylesbury) took some of his services off at the middle of the span, but, as he was careful to "support" the wires (in the words of the Regulation) by taking the service off at the point of support, he complied with the Regulations.

Mr. W. A. Turnbull said he brought the four wires to an insulator, bound them together, and took the two wires for the service off that, which he regarded as a much better engineering job than running a catenary wire, because the latter would involve more windage, which meant the allowance of a greater factor of safety for the poles and, therefore, an expenditure of money that could not be afforded in rural areas. With regard to crossing telephone wires, he thought the supply authority should take the risk of their flying up in the air during storms, and certainly where the power line was the second comer means should be taken by the supply authority to prevent contact. He was running a service to a farm which would cross two telephone wires and he was endeavouring to ascertain whether the latter could be insulated at the crossing.

Major T. Rich said that only in this country did the Regulations insist upon very expensive cradles; things of that nature were gradually disappearing in other parts of the world. Those responsible for the social services should meet together and endeavour to arrange them to be carried on at the least possible expense as was the case abroad.

MR. W. C. BEXON explained that the main point was, from his point of view, that the Central Electricity Board had erected its lines over his lines without fulfilling Regulation 5.

MR. GRIMMITT said it was not at all certain that that was so; Regulation 5 could be read in more than one way.

Mr. C. W. Marshall (Central Electricity Board) also said that Regulation 5 was not quite clear, and it was arguable whether the Central Electricity Board had complied with it. He agreed that the Regulation should be clarified.

The resolution was moved, but no definite decision was arrived at.

MR. W. C. BEXON, regarding Regulation 13, "Minimum Height of Conductors," felt that in sparsely populated areas where lines could be run along the hedges, the height should be reduced in places inaccessible to vehicular traffic from 15 ft. to 12 ft. for low-pressure lines. There should be a distinction between high-pressure and low-pressure. In the case of a supply to a farm, perhaps ¼ mile away from the transmission line, it was necessary to have a transformer and switchgear, and their cost, together with the cost of the overhead-line, was such that the revenue was very often not sufficient to warrant the capital cost; therefore, any reduction of the cost of the overhead-line would be a great advantage.

A resolution to that effect was adopted.

MR. W. FENNELL moved that the Commissioners should be asked to delete the provision in Regulation 14, "To Prevent Danger," relating to a bonding wire being connected to the supporting metalwork of all insulators, because it introduced danger to men working on the poles.

The resolution was agreed to.

It was then suggested that the words at the end of Regulation 14, "For this purpose an insulator shall be placed in each stay wire at a height of not less than 10 ft. from the ground," should be deleted. As the voting for and against the suggestion was equal after it had been put to the meeting twice, it was agreed to submit the proposal to the Commissioners for consideration, not as a recommendation.

MR. W. FENNELL, with regard to Regulation 15, "Factor of Safety on Line Conductors," said he had been asked to represent the Provincial Electric Supply Committee at a conference with the Minister of Transport at Manchester, at which supply authorities were to be asked why they did not go out into the country. The reason they did not was Regulation 15. The factors of safety of high-pressure lines were too great; the ½-inch ice loading rule involved the use of thicker poles and bigger sags than with low-pressure lines, which struck at the heart of the whole thing. There should be some easing of the loading conditions for truly rural lines; therefore, the Low-pressure Regulations with regard to factors of safety should be used for rural high-pressure lines. To give supplies in rural districts it was necessary to contruct lines at £150 per mile, and £30 worth of electricity must be sold per annum to cover interest and depreciation charges on a 10 per cent. basis. He had been trying very hard to construct rural high-pressure lines under the existing Regulations at less than £225 per mile, but he could not do so.

The resolution was passed.

MAJOR T. RICH said that Regulation 17, "Provision to Prevent Danger," was unique in this country. Neither in America nor in most places on the Continent was it necessary to earth in the manner suggested, and he moved that all earthing, except on steel poles, should be eliminated.

The proposal was agreed to, with the proviso that all switchgear should be earthed.

MR. W. FENNELL, referring to Regulation 18, "Road Crossings, &c.," and the proviso that certain precautions must be taken in the case of a wire erected within 50 ft. of a road or canal, suggested a distance of 10 ft., or a distance equal to the height of the highest wire from the ground at the centre of the span.

The resolution was passed.

It was agreed to ask for the deletion of the requirements from Regulation 18 that duplicate insulators supporting duplicate conductors tied at intervals not exceeding 5 ft. should be used when crossing a public road, the suggestion being that it was unnecessary, having regard to the other requirements of this part of the Regulation.

MR. W. FENNELL, speaking on Regulation 19, "Danger Notices," contended that danger notices attached to the poles were sufficient. Anti-climbing devices were nothing more than an incentive to boys to dare each other to climb the poles; barbed wire was a considerable danger to linesmen and he had had several cases of blood poisoning.

The proposal was agreed to.

The president said the Council had been considering Form El.C.53B. What with submitting maps and providing the information demanded, both by the Electricity Commissioners and now the Central Electricity Board, supply undertakings were being put to considerable expense in providing clerks for the work.

Mr. Grimmitt pointed out that the Form was necessary for statistical records so that the Government could know how many overhead lines existed in the country, because the Air Ministry and the Ancient Monuments Board were concerned. In the case of a duplicate design it was only necessary to submit a plan and refer to the previous application.

A proposal that the Commissioners be asked if it were possible to do away with Form El.C.53B in the case of those undertakers who had been doing overhead-line work for a period of three years was agreed to.

The meeting closed with a vote of thanks to Mr. Grimmitt, of the Electricity Commissioners staff, for the assistance he had given at both meetings.

Oil-engine Working Costs.

Extracts from the annual report on the working costs of heavy-oil engines prepared by the Diesel Engine Users' Association for the year 1929-30.

RETURNS were obtained from 44 electricity generating stations using heavy-oil engines, a smaller number than was received for the preceding year, but a good variety of results is available, though no stations using only engines of the semi-Diesel type are represented.

The low-time service of some of the larger engines is due to their having been installed for peak-load and emergency work. The last eight years have marked the introduction of engines of increasing size and of new types, such as fast-running engines with steel cylinder liners, steel cylinder heads and other interesting features, the two-stroke opposed-piston engine, and the mechanical injection engine, all of which are now thoroughly established and giving satisfactory service. This year there is a representative of the supercharged type.

During 1929-30 new engines of an aggregate capacity of 3,500 kW were installed. Among the home stations the average cost showed an improvement of about 5 per cent., due mainly to a tangible fall in the price of fuel oil. The average cost for overseas stations was higher by about 14 per cent. than in the preceding year, due to a higher average price of fuel oil, unusual repair costs, and abnormally heavy lubricating oil consumption in a few individual stations. Group results show again that there is little to choose as regards performance between air-injection and mechanical-injection high-compression engines made by recognised firms.

The total output was shared between the 199 engines employed during the year as follows:—138 engines of from 42 to 499 b.h.p. generated 44.3 per cent. of the total output; 49 engines of from 500 to 999 b.h.p. generated 42.6 per cent. of the total output; 12 engines of from 1,000 to 1,700 b.h.p. generated 13.1 per cent. of the total output. The average gross calorific value of the fuel used is taken at 19,500 B.th.u. per lb. The general average fuel consumption per kWh generated was 0.708 lb. (equivalent to about 13,800 B.th.u.), at an average running-plant load factor of 64.3 per cent. The overall thermal efficiency was therefore about 24.7 per cent. The fuel consumptions were slightly better all round than in the preceding year.

The general average consumption of lubricating oil (0.00068 gallon per kWh generated) was slightly better than in the preceding year. In terms of rated b.h.p.-hours run per gallon the comparative figures were 1,385 in 1929-30 and 1,345 in 1928-29. The average cost of repairs and maintenance was higher than in the previous year, the figures being: home stations 0.127d. in 1929-30 and 0.104d. in 1928-29; overseas stations 0.156d. in 1929-30 and 0.077d. in 1928-29. With regard to home stations, the increase was due to an exceptionally heavy repairs bill at the Southend station and to a fall in the annual station load factor. In the overseas group there are several stations from which returns had not previously been received; the repair costs of some of them were higher than usual, and the reason for this may be that the respective plants are working at high altitudes and the costs of labour and material are high. The annual average cost of repairs and maintenance per kWh generated, including renewals and labour, for the home stations during the last eight years have been:—

Year.	Number of Stations.	Per kWh Generated. (Pence.)
1922-23	29	0.188
1923-24	34	0.197
1924-25	36	0.144
1925-26	37	0.137
1926-27	41	0.107
1927-28	38	0.108
1928-29	42	0.104
1929-30	32	0.127

The Southend results in 1929-30 accounted for £9,878 out of a total repairs cost of £23,647 for the home stations, and

brought about the increase in the average overall cost per kWh, but it still appears, in the light of the results so far obtained, that about 0.035 pence per hour per rated kW would be a reasonable amount to allow in estimates for the cost of renewals and contractors' labour with regard to engines of normal types under ordinary working conditions. It is well known that the Southend engines are of an unusual type for land service, have been expensive in maintenance, were installed at a difficult time in special circumstances, and have done hard service.

The above factor for the cost of renewals and contractors' labour (exclusive of cost of power-station maintenance staff) is only, as in the previous reports, put forward as a tentative value for estimating purposes. A consideration of the results of the more modern engines indicates that the cost of repairs tends to fall, especially where the engineer takes full advantage of the now available information and instruments applicable to operation.

The value of the Committee's report could be very greatly increased if more members would make a practice of sending in notes of their observations on the wear of parts, measures adopted for improving operation, lowering costs, &c. For instance, if more figures relating to cylinder wear could be obtained it might be possible to deduce the causes of variations. It has been suggested that there is an economic limit to the life of liners, quite without respect to the length of time that they can be operated satisfactorily mechanically; that is to say, it might become worth while to renew liners on the ground of the fuel saving which would thereby be effected long before the liners had worn sufficiently to impair the satisfactory mechanical operation of the engine. The Worthing station carried out extensive renewals of cylinder liners last year, and there was subsequently a notable reduction in fuel consumption. It has been suggested that, for the types and sizes of engines so far dealt with in these reports, liner wear of about 0.080 inch is about the economical limit.

Development in S. Africa.

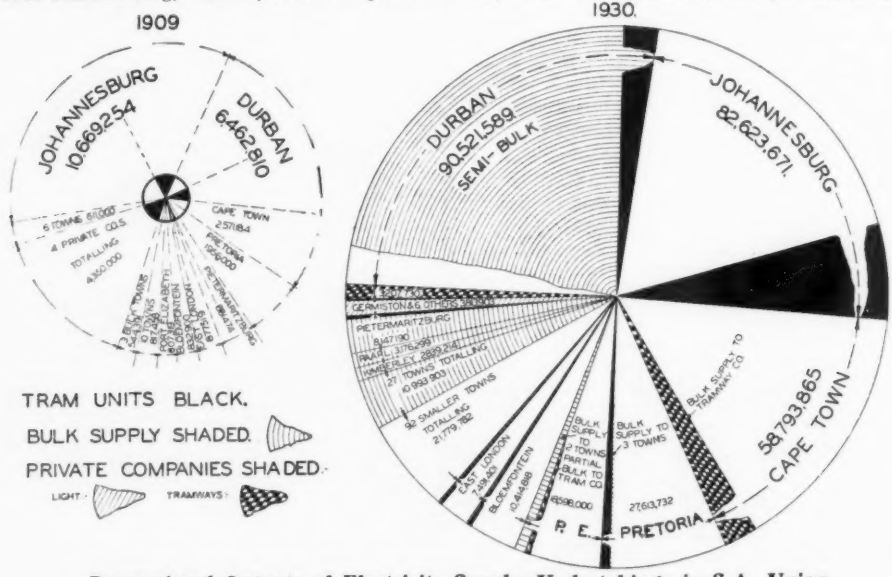
A review of the work of the municipal electricity and tramway undertakings in the Union.

By E. POOLE, A.M.I.E.E.

(*Extracts from an article in the Twenty-first Anniversary Commemoration Journal of the* S.A. INSTITUTE OF ELECTRICAL ENGINEERS.)

IN 1909 there were only 27 undertakings supplying light and power, and four tramway concerns, in South Africa, while the total has now reached 141 for lighting and power and three tramway companies. The largest installation is at Johannesburg, with 52,300 kW of plant installed, while Harrismith is the only single-phase station existing. The capital expenditure represented by the existing undertakings amounts to close on £12,000,000, with just over 150,000 kW of plant installed.

The accompanying scale diagrams show at a glance the number of kWh sold in the various undertakings, both in 1909 when there was produced in total over 31,000,000 kWh, and in 1930 with a production of over 350,000,000 kWh. It will be seen that Durban and Johannesburg between them sell practically one-half of all the energy used, and that whereas Johannesburg had the largest sale in 1909, this honour has now fallen to Durban. It is highly gratifying to the municipal electrical engineer to find his efforts so well rewarded by the ever-increasing demands for current for industrial purposes, to say nothing of the large domestic demands.



Proportional Outputs of Electricity Supply Undertakings in S.A. Union.

While production costs for similar equipments appear to vary strangely, it has to be borne in mind the very great differences in coal costs in the various towns, from as high as 46s. 1d. per ton at Upington in the Cape, to as low as 6s. 6d. per ton at Dundee. A number of installations exist with non-condensing equipment, either because of the lack of water, or of its being too costly to use. Oil and gas plant is now being largely used in the smaller towns.

While the supply of current in bulk to municipalities was practically confined to the Rand in the 1909 period and mostly undertaken by the Victoria Falls Power Company, we find to-day other bulk supplies by the Electricity Supply Commission, as well as other secondary supplies. Unfortunately, however, the very scattered nature of South Africa precludes anything like a general bulk-supply system.

The tariffs in vogue vary from as low as 5d. per kWh primary charge, based on the rateable value, and a secondary rate of ¾d. per kWh in Durban, or as lately introduced at Capetown 4½d. per kWh primary charge, on a room basis, and a secondary rate of ¾d. per kWh for domestic supply, to as high as 1s. 3d. per kWh, as in Bedford, Calvinia, Cathcart, Colesburg and Windhoek. Power-supply rates vary from 1½d. to ½d. per kWh in Durban and Johannesburg to the ordinary lighting rates in some towns.

Generally speaking, the policy of the electrical undertakings in the Union may be described as one of progress with caution, as a direct result of which the majority of them are on a sound financial footing to-day. The most striking present-day tendency is undoubtedly the desire to cater for the domestic load, the vast possibilities of which are at last realised.

The keenness of the electrical engineers to keep their equipment "up-to-date" by installing more efficient plant and reducing operating costs has enabled tariffs to be lowered so as to attract every class of consumer. Examples of this policy may be seen in Johannesburg, with its new power station, and the remodelling of the Capetown station, with consequent reductions in tariffs. The policy of the larger towns particularly is to seek powers to supply outside the limits of the municipalities; the Electricity Control Board has granted Durban a sixteen-mile radius beyond the borough boundary, which embraces practically all the suburbs, most of which are at present supplied, while Port Elizabeth supplies as far as Uitenhage, and Pretoria also supplies most of the adjoining municipalities. Capetown supplies most of the Cape Peninsula municipalities, which now form part of a unified Capetown.

With regard to street lighting, decided improvements are taking place, at any rate in the larger towns, where, since the motor car has come into such popular favour, traffic conditions have demanded a greater intensity of street lighting. The arc lamps of the earlier days are now almost entirely replaced by high-candle-power gasfilled lamps.

A brief reference should be made to electric tramways, which are to be found in Johannesburg, Durban, Pretoria, Pietermaritzburg, Bloemfontein, East London, Capetown, Port Elizabeth and Kimberley, being controlled by the municipalities, except in the three last-mentioned towns where private companies have retained ownership since their inception. In Bloemfontein we have, so far, the only example of railless tramway in South Africa. The question of the introduction of the railless tramcar is receiving serious consideration. That tramways at the moment are passing through a very depressing period is shown by the recent closing down of the Camps Bay system, and most tramway undertakings are experiencing a falling revenue.

There are no Board of Trade Rules in South Africa, as in England, though the English Regulations are in the main observed; there are, however, the Mines, Works and Machinery Regulations, and also the Post Office Act, which the undertakings are subject to, as well as also the special Union Acts and Ordinances in the particular Provinces. Of late years Boards for the registration of wiring contractors and licensing of wiremen have been established in a few of the principal towns, thus improving the reputation of the industry and protecting the consumer against "jerry" wiring.

Electrical Instruments.

Progress in Manufacture During 1930 as shown by the recent exhibition of the Physical Society.

By A. C. JOLLEY, A.M.I.E.E., F.Inst.P.

ONE of the most valuable features of the annual exhibition of the Physical and Optical Societies is that it offers an excellent opportunity to observe the progress that is made year by year in instrument design and manufacture. The twenty-first exhibition which has just closed certainly gave evidence that instrument makers during the past twelve months have not relaxed their efforts to maintain the high level of design, workmanship, and manufacture, which they have attained in past years. To those who are familiar with the way in which the development of a particular design has to be carried out and realise the great amount of time which has to be expended in experimentally investigating both the performance and processes of economical manufacture, it will not be surprising that this year's exhibition did not show a great deal which could be regarded as either new or novel. There was, however, ample evidence that manufacturers have, during the past twelve months, been concentrating on producing accurate and highly finished instruments by processes which are economically admirable, for although it may be possible to produce a perfect design, it is quite another proposition to produce the instrument on a sound commercial basis.

Indeed, in some respects the exhibition may prove an evil influence, in that it may stimulate manufacturers to show apparatus before it has received sufficient trial and investigation, so that an unwary purchaser may find himself in possession of "obsolete" models.

Increasing Use of Moulded Insulation.

The outstanding feature of this year's exhibition was the very general employment of moulded bakelite products, and some very beautiful examples of the moulding art were to be seen. The unique physical properties of the material, and the possibility of being able to produce parts straight from the mould which require no further machining or finishing are, of course, of first importance in producing first-class instruments in quantity, and it is not, perhaps, too much to say that a good knowledge of bakelite-moulding technique will in future form a very important factor in the education of a successful commercial instrument designer.

Among the exhibits of precision and laboratory apparatus small changes in construction were noticeable. Messrs. Tinsley are protecting the insulator on which the contacts of some of their resistance boxes are mounted by sinking it below the level of the sides of the containing box and fitting over the top a thin black bakelite cover cut away clear round the terminals, so that the superior insulating qualities of the main insulator are retained while the greater durability of the bakelite preserves the good appearance of the instrument, as well as affording definite protection to the main insulator from dust and light.

In some instances it might be suggested that a more free use of the engraving machine should be made on the more complicated examples of apparatus shown; in quite a number of instances it was noted that the clear marking of terminals, circuits, voltages to be applied, &c., were either omitted or inadequately carried out.

All laboratory apparatus should be provided with some protection in the form of a wooden lid or cover, preferably unhinged, so as to be completely removable, and if the terminals are arranged externally, the apparatus may have its cover replaced without disturbing the connections to it, and the instrument is protected from dust, a matter of considerable importance when long researches are in progress. These covers form an excellent place for connection diagrams of the apparatus: a black and white diagram is infinitely to be preferred to the blue prints now so often used, and it is not more difficult to prepare.

The practice of putting a circuit diagram under the instrument is particularly objectionable, and is now seldom practised, for it is obviously absurd to have to turn an instrument upside down to read the connection diagram.

The growth of electrical testing at audio and higher frequencies has necessitated considerable attention being given to the production of resistances with very small residuals, and several schemes are now successfully employed for securing this in any single coil. The grouping of the coils and their effective screening, however, present much greater difficulty. Screening each individual coil has disadvantages and Messrs. Tinsley in their decade resistances of this type counteract the almost parabolic rise of negative inductance as the resistance in the dial is increased by adjusting each of the coils according to its position in the dial.

Alternating-current Potentiometers.

The great value of the a.c. potentiometer is now being more generally appreciated, but the high first cost of the equipments offered is much against their more general adoption, and one is inclined to believe that all has not yet been done to produce less elaborate forms for more general test room use. A good equipment of this type not only increases the range of work which can be undertaken, but at the same time it displaces a considerable amount of apparatus which would otherwise be required to accomplish the same work less expeditiously.

The development of this class of instrument is proceeding along two distinct lines. In the first the "polar" principle first introduced by Dr. Drysdale employs a phase-shifting transformer to adjust the phase of the potentiometer current; while the second is based on the "co-ordinate" principle and measures the two rectangular co-ordinates of the p.d. under investigation.

The potentiometers of Dr. Drysdale, D. A. Oliver and B. S. and T. D. Smith are of the first type, while the instruments of D. C. Gall and the Campbell Larsen potentiometer of the Cambridge Instrument Co., Ltd., are of the second type. There are important arguments in favour of both systems, but one feature which differentiates them seems to have escaped notice. In the "polar" principle the phase datum is fixed by measurements made on a non-inductive resistance in the circuit, but with the co-ordinate potentiometer there is no such fixed datum, and a measurement on a non-inductive resistance in the circuit will involve settings both on the "inphase" and "quadrature" elements of the potentiometer; as a consequence it is more easy to visualise the phase relations in the circuit under investigation when using the polar potentiometer and the final result can be obtained much more expeditiously. Four of these potentiometers are capable of being used on circuits at audio frequencies.

Condenser Development.

The air-dielectric condenser in its simplest form calls for the highest class of mechanical precision if the calibration is to be relied on, and some excellent examples were shown.

One ingenious modification of the cylindrical condenser, due to Dr. Moullin, for the measurement of very small changes of capacitance, consists of a fixed outer cylinder and an inner cylinder arranged so that on rotation about an axis, eccentric but parallel to the length of the cylinders, the distance between the inner and outer cylinders is varied and the capacitance is changed.

The excellent scheme of the Sullivan-Griffiths condenser has been further developed. A glass vane rotor is employed; the vanes are silvered and then coppered on their surfaces. In these metallised surfaces isolated areas of the metal are formed on each side and put into metallic contact with one another through holes in the glass. This rotor moves between fixed metal vanes which are alternately at opposite potentials. No connection is necessary to the moving element, and any distortion of the rotor vanes does not influence the capacity values, so that two of the most important uncertainties of the ordinary vane condenser are removed, while by shaping the metallic areas in the moving vanes perfectly smooth variation is obtained. The oscillograph has now become more or less standardised in form, but there has recently been great activity in the development of measurements at telephonic frequencies which necessitate the employment of a number of vibrators, and a six-element instrument on the Duddell principle has been developed in very compact and convenient form by the Cambridge Instrument Co. for this kind of work.

Indicating Instruments.

In commercial indicating instruments this is the age of the miniature instrument and excellently constructed examples of most of the usual types of movement reduced to miniature size are being produced. It is now possible to obtain electrostatic instruments for voltages up to 3,500 volts in a 2½-in. case, and these instruments, preserving all the good features of a larger instrument, are shielded and have high resistance protection against flash-over.

The employment of nickel-iron for the movements of moving-iron instruments is now very general. Miniature instruments

of this type, adequately damped, magnetically shielded, and with remarkably good scale shapes are being produced.

The very general adoption of the moulded bakelite case is giving switchboard instruments of the smaller type a neat, light, and well finished appearance, and beside them the black and nickel cases of a few years back look heavy and rather clumsy.

The use of the thermo junction and also the dry rectifier in connection with the moving-coil instrument for small a.c. measurements is becoming very general, and the difficulties which occur at very low voltages with rectifier-operated instruments have been cleverly surmounted by Messrs. Everett Edgcumbe, Ltd., who include a small transformer in the instrument and are thus able to produce instruments with a full-scale reading for one milliampere or one volt.

For permanent magnets cobalt steel is now being much more widely used and it is noticeable that several manufacturers are now using cast magnets of this material. It should, however, be pointed out that there is a temptation to take advantage of the high coercive force of this material and use very short magnets without taking sufficiently into account the higher leakage which may result from the great reduction of dimensions.

Frequency indication has now, on account of the increased interlinking of power systems, become a matter of showing differences of a few cycles; indicating frequency meters and recorders are being produced with very open scales, and it would seem that the resonant-circuit principle is found best for this purpose.

Current Transformers.

Instrument transformers with nickel-iron cores are now constructed with remarkably accurate performance both in respect of ratio and phase angle. It was, however, noticeable that the "clamp or scissors" type of current transformer is being revived, in which the magnetic circuit is split or hinged so that it may be opened and slipped over the conductor carrying the current to be measured. The scheme was introduced many years ago and fell into disfavour because the performance of the apparatus depended on frequency and air gap. Its revival has become possible because of the accurate standardisation of frequency and a more complete knowledge of the theory of such transformers, but, under the best of circumstances, the accuracy is limited. On the other hand, the possibility of being able to even approximately measure a current in a conductor without disturbing the connections or interfering with the insulation is very valuable.

Many of the examples shown were for single-hand operation, and the current was indicated on a miniature instrument permanently mounted on the transformer.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this section.

Trailing-cable Testing Apparatus.

Messrs. IMESON & FINCH, LTD., Empress Works, Stockton-on-Tees, have recently introduced a testing machine by means of which it is claimed to be able to locate any type of fault on trailing cables for coal-cutting machines. The machine, fig. 1, consists of a small switchboard, equipped with three switches for operating the set, and a specially made indicator lamp which has three functions, namely: when the lamp does not light at all—indicating a "dead short"; when the lamp glows in the filament only—indicating a sound cable; when the whole of the gas in the lamp is illuminated—indicating a fault either between cores, or from the cores to the outer sheathing or earth. One switch operates the h.p. circuit, the second switch is merely to test the batteries before operating, and the third switch operates the l.p. circuit. An indicator is also fitted to the board in the form of a milli-ammeter. To test for a fault to earth, the cores are connected on the h.p. side to one terminal, the other terminal being connected to the outer sheathing. This circuit is then brought into operation by switch No. 1, and a high-pressure current passes into the cable through the fault and into the outer sheathing. This pressure is maintained until the fault becomes carbonised, which is immediately shown by the indicator lamp becoming extinguished. All that is necessary then is to connect the leads to the l.p. side of the board and pass the cable slowly through the press. Immediately the fault is reached there is a deflection on the milli-ammeter, owing to the pressure exerted upon the carbon in the fault, and the cable can then be opened out at the exact spot where the fault really is. The same operation can be used for testing between conductors.

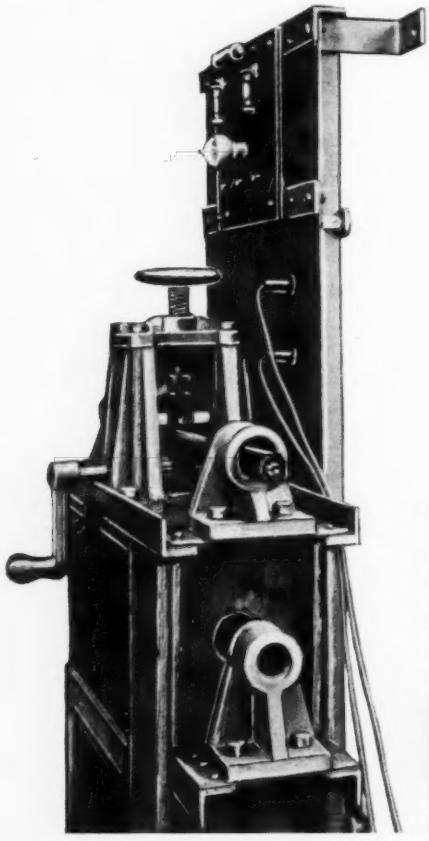


Fig. 1.—"I. and F." Trailing-cable Tester.

Improved Coil-winding Machine.

In these columns of our last issue, under the above heading, we published a brief description of the "Quickway" coil-winding and forming machine for armature and stator coils, produced by the MIDLAND DYNAMO CO., LTD., Volta Works, Belgrave Gate, Leicester. Unfortunately, the illustration published with the description does not represent the improved present-day machine, but an original model which has never been put on the market. It is desirable to rectify any wrong

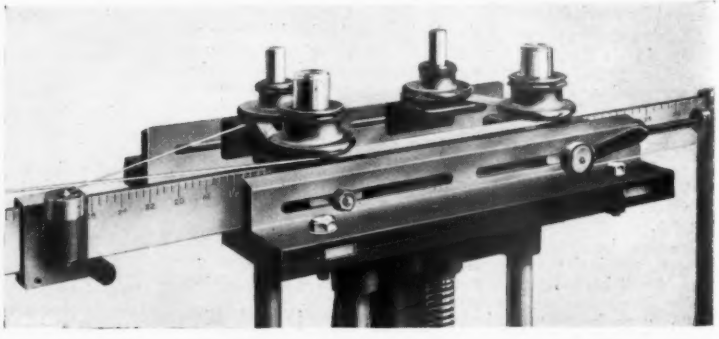


Fig. 2.—"Quickway" Variable Attachment for Stator Coils.

impression which may have been created by the publication of the illustration of the old model, and we therefore draw attention to the accompanying illustration, fig. 2, which shows a special attachment used with the improved machine for station-coil winding of variable dimensions.

A New Dwarf Circuit Breaker.

In view of the present tendency to use miniature circuit breakers instead of fuses, it is interesting to note the introduction of a small d.p. breaker by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. Embodying all the advantages of the s.p. type, the maker's d.p. dwarf circuit breaker is made in suitable capacities (2 to 15 amperes) for controlling small domestic appliances, for which uses it has the following advantages over a fuse: the breaker can be used as a switch; it operates at a definite overload, with no liability to deterioration or abuse; simple reinstatement of

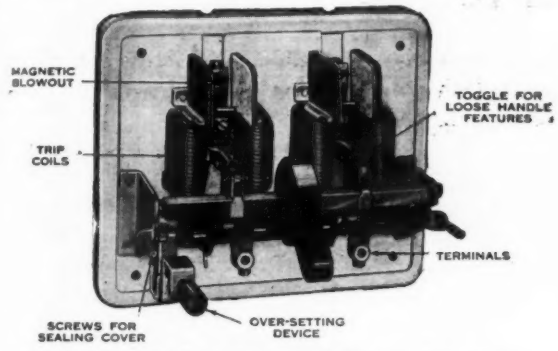


Fig. 3.—G.E.C. D.P. Dwarf Circuit Breaker; Cover Removed.

the circuit by operating the handle of breaker; the loose-handle feature prevents the breaker being held closed if a fault still exists; there is no fear of shocks or burns.

Under working conditions the new breaker operates instantaneously on overload or short-circuit. It can, however, be used as a switch, even when the circuit controlled takes an initial current much larger than the normal current, an oversetting device being provided which can be brought into operation by pressing a push-button while making the circuit; if the current exceeds the oversetting value the breaker operates instantaneously. The overload calibration is about 100 per cent. above the normal capacity, and the oversetting device increases the amount of initial current that can be dealt with before tripping to four to six times the normal current. The breaker occupies considerable less space than a switch and fuse. A non-metallic fireproof cover of moulded insulation is mounted on a porcelain base in which grooves are provided to enable connections to be brought in at the top and bottom, and the terminals are arranged for back or front entry. The breaker can be sealed to prevent interference by unauthorised persons. Its construction is depicted in fig. 3.

A Bakelite Junction Box.

Messrs. S. O. BOWKER, LTD., 49, Queen Victoria Street, E.C.4, the patentees of the "Tenby" wiring system, have marketed an improved junction box, fig. 4, for use with c.t. cable. This is in brown bakelite, and follows the lines of the

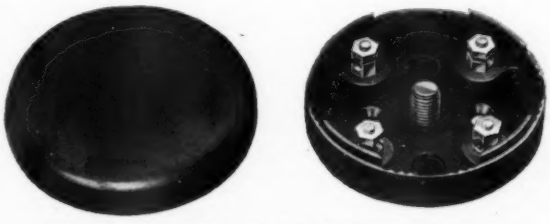


Fig. 4.—"Bowker" Moulded Junction Box.

makers' "Tenby" universal junction box, inasmuch as ample provision is made for the entry of one to three twin cable leads at four points. The "knock-out" system is used to ensure that the openings are not larger than necessary to accommodate the number of cables entering, and provision is also made at two places for back-entry, again on the "knock-out" principle. The box is fitted with four hexagonal brass connectors, each with a slotted side mouthpiece, and a grub screw to hold the cable. This type of connector gives ample and effective jointing area, and practical users will appreciate the advantages of the slot over the central-hole method. The box is 3 in. in diameter, and has a central lug screwed for fixing the lid, which is provided with a long central threaded tube, the result giving a very satisfactory attachment for the lid, and finishing off a sound box, with a pleasing appearance.

Parliamentary Notes.

(By Our Special Parliamentary Reporter.)

Central Board Contracts.

On January 28th MR. HARDIE asked the Minister of Transport if he would state the total amount of money spent in carrying out the provisions of the Electricity (Supply) Act, 1926, so far as they had gone to the nearest date.

MR. MORRISON said he understood that contracts to an aggregate value of £18,200,000 for the construction of the grid system had already been entered into by the Central Electricity Board and that it had, in addition, authorised expenditure amounting to over £4,250,000 on the standardisation of frequency.

Overhead Lines in East Sussex.

On January 28th REAR-ADMIRAL BEAMISH asked the Minister of Transport what progress had been made in the districts adjacent to the overhead lines in East Sussex to supply cheap or any electricity to farmers and other workers and residents; and what steps he was taking to hasten, cheapen, and facilitate such supplies.

MR. MORRISON said that the actual supply of electricity to farmers and other workers and residents in the districts adjacent to the overhead Grid lines in East Sussex was a matter for the authorised distributors for the districts concerned. All those distributors were making progress in the development of their undertakings, and at a recent conference at which representatives of those undertakings were present he urged the putting in hand of further distribution developments in acceleration of their normal programmes, the offer of attractive two-part tariffs for domestic supplies, and facilities for assisted wiring and hire-purchase with a view to stimulating development.

Electrical Development and Railway Electrification.

On January 28th MR. MALONE asked what steps were being taken to expedite work on general electrical development and on the electrification of certain railway lines with a view to the provision of work for the unemployed.

MR. MORRISON said he would refer the hon. member to the section on electricity in the chapter on "Economic Reorganisation" in the recent White Paper on "Measures taken in connection with Unemployment" (Cmd. 3746, pp. 13 and 14). Since the date of that paper he had found opportunities to confer personally with leading representatives of the electricity supply industry in London, Glasgow, Leeds and Manchester, and had appealed to them to speed up transmission and distribution development in advance of normal programmes, both in urban and rural areas, as well as to expedite changes-over, where necessary, to standard frequency, and voltage. He had also drawn attention to the need for more general arrangements for hire and hire-purchase of apparatus and of a regular "after-sales service." As regarded the second part of the question, work was well in hand on the extension schemes of the London Electric Railways and on the Dagenham-Upminster section of the L.M.S. Railway, towards which grants had been made under the Development (Loan Guarantees and Grants) Act, 1929. The Southern Railway electrified over 55 route miles in 1929 and 1930 and was proceeding with other sections; and the Manchester South Junction and Altrincham railway was also being electrified. He was informed that the L.N.E.R. was making definite progress with regard to its proposals for the electrification of its old Great Northern suburban system.

Employment on Underground Railways.

On January 28th MR. MUFF asked the Minister of Transport if he had any information as to how many persons were employed on the London Underground Railways as a result of the London Electric Railways Act, 1930; and what amount of money had been advanced from the Exchequer.

MR. MORRISON said that the latest returns furnished to the Ministry of Labour recorded 971 men as directly employed on December 19th, 1930, on works on the London Electric Railway and the Central London Railway assisted under the Development (Loan Guarantees and Grants) Act, 1929. The figures took no account of the indirect employment afforded. Under the terms of the grant made to the undertakers, the first payment in respect of interest was due to be made on October 1st, 1931. No money had, therefore, yet been issued by the Treasury in respect of these schemes.

The L.M. & S. Railway and Electrification.

On January 28th LIEUT.-COL. MOORE asked the Minister of Transport if he could make any statement on the electrification of the London, Midland and Scottish Railway line between Glasgow and the Ayrshire coast resorts; when this scheme was to be put in hand; its cost; and the date of completion.

MR. MORRISON said he was informed by the London, Midland and Scottish Railway Company that it had been examining the possibilities of electrifying the lines in and around Glasgow, but that, so far, a definite decision on the matter had not been reached.

Trade Disputes Bill.

The Trade Disputes and Trade Unions (Amendment) Bill, which seeks to amend the Act of 1927, was read a second time in the Commons last week by a majority of 27. It will now go to a Standing Committee, but, in view of the Liberal intentions to amend it drastically, it is doubtful whether it will ever reach the House of Lords. During the closing stages of the debate SIR S. CRIPPS, the Solicitor-General, said that the general strike would have been illegal under the Act of 1927. Under the proposed Bill also, in his opinion, the strike of 1926 would have been illegal, and for this reason, that, though it might be said that it was in some degree in furtherance of a trade dispute, yet, looking at the substance of the matter, he had no doubt that a court of law would have held, had the present Bill then been the law, that the primary object of the strike was not industrial and that therefore the strike would have been illegal.

Correspondence.

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession.

The Newest Electric Ships.

The letter from your correspondent, Mr. Ernest H. Sheldrick, has been brought to my attention, and I should like very definitely to make the point that there is no intention on my part to suggest that electric propulsion came originally from America. Probably, like most marine engineering and other engineering developments, it started in two or three countries simultaneously; after all these years of marine internal-combustion development, we are still arguing as to who actually was the inventor. Dr. Diesel gets the credit because he was the man who made it a commercial proposition. Similarly, America to-day is getting a great deal of credit for electrical propulsion because two big American electrical companies were the first to make it a commercial proposition so far as the marine world was concerned.

The idea now is spreading rapidly here and for a conservative country like Great Britain I think it is right to suggest that the progress which has been made during the last year or so has been proportionately at a far greater rate than anything that has taken place in America.

A. C. Hardy.

London, E.C.3, *January 26th*, 1931.

Thoughts that Pass in the Night.

I read with interest the contribution of Mr. H. Roberts published in your issue of January 23rd, 1931. His sub-station experiences are very typical of those of the average attendant, but cannot be considered in any way complete.

In addition to the duties he names, I have discovered that a sub-station attendant is also expected periodically to "blow out" and inspect departmental plant which is installed on consumers' premises. He also becomes "static sub-station inspector and cleaner," while, when stores are located near the "sub.," he may also be emergency storekeeper and clerk.

An attendant should never despair of promotion, for it is possible for him, providing that he has the qualifications of an A.M.I.E.E., to become a junior assistant records clerk.

In my own case, however, that promotion can never come, owing to my avaricious nature, for I prefer the company of convertors, with my present salary, to the "improved status" and a salary decreased by almost 30s. per week.

Handyman.

January 26th, 1931.

Replies to Technical Queries.

Not long ago I had occasion to write to a large London electrical firm. My letter complained of the short life of the heating units in certain electric fires. As I desired to put essential facts about high-temperature wire before students I added to the complaint a request for any available statistics and for information as to the causes of hot-spots. The answer was a formal typed communication signed by the publicity manager, saying that the cause of hot-spots was injury caused by the user to a coating of carbon on the surface of the wire!

More recently an evening student at the Northampton Institute brought to me an electrical pocket-book issued by another firm in which the resistivity of material was given in microhms "per cubic centimetre." I agreed that it was bad, and suggested that he should write to the firm himself. He did so and received a reply signed by the publicity manager containing the following statement:—

> "We feel that the designation 'cubic cm' is quite as accurate as 'cm cube,' and in any case when dealing with liquids the former would be correct."

It is bad enough that ordinary customers should be fobbed off with balderdash about a carbon coating and that an inquiring student should receive an ignorant reply that is no answer. It is worse that a publicity manager should be sufficiently inept to insult the intelligence of a correspondent using paper with "M.I.E.E." printed after his name.

It is worst of all to reflect upon the available unemployed men who combine reasonable technical knowledge with the qualities necessary for a publicity manager.

Such "funny men" in our great firms are cause for mirth and also for disgust at a degree of imbecility that is a disgrace to the industry.

R. P. Howgrave-Graham.

London, N.W.3, *January 26th*, 1931.

[This letter has been abridged.—EDS. ELEC. REV.]

Careers for Young Engineers.

Letters have been printed in the "REVIEW" concerning methods of obtaining technical training.

I, for economic reasons, was apprenticed, after leaving a technical school, to a large firm of general electrical engineers in the North. I continued my studies at evening classes, and now, by dint of hard work, I have, at 21 years of age, the Higher National Certificates in both Electrical and Mechanical Engineering, with distinction; I have also passed the City and Guilds Final in "Electrical Design," and a very full works training is behind me.

I am, however, now employed by a different firm; my experience is particularly unsuitable, and my salary is less than £3 per week. I think I can recommend my way for real training, but of what use is it?

Despair.

January 26th, 1931.

[The future will show. Our correspondent is only on the threshold of life, and far less propitious starts have matured well.—EDS. ELEC. REV..]

Wages in the Electrical Contracting Industry.

I note from his letter published in your current issue that "Hadsum" is not an electrical contractor. May I point out to him the difficulty of a national agreement to meet the case of each individual private employer? If he finds the 3s. 0d. increase a burden, I should advise him to discharge his wiremen and employ a contractor to look after his electrical installation; he would save money if he selected a reliable firm.

I notice he still makes a point of the *present* cost of living. Did he take advantage of reductions in the past, when the cost of living, at the time the reductions came into force, was increasing? This has usually happened each October. May I also refer him to page 820 of your issue of November 14th, 1930, where he will see that the present variation only takes us up to March, 1931, when a further review will take place which will include the present low period, and thereafter at twelve monthly periods?

"Hadsum" abides by his letter of January 3rd, 1930; he does not, however, suggest an alternative. Criticism is to the good, but let it be constructive.

Ex-Councillor E.C.A.I.

January 31st, 1931.

The D.O.T.

The issue of the ELECTRICAL REVIEW dated December 5th reminded me that during the recent visit of the British Economic Mission to the Far East, a meeting took place between the Mission and representatives of various business houses operating in Tokyo.

During the discussions which took place the question of the D.O.T. and its overseas representatives was raised. The general consensus of opinion was that the activities of the D.O.T. overseas representatives were somewhat hampered by the dignity of their diplomatic status; further, that this organisation compared rather poorly with similar organisations in other countries, notably Germany, Canada and the United States, which are extremely active.

Members of the British Economic Mission gave their assur-

ance that the constructive criticisms of this representative gathering of business men would be duly reported, and no doubt Mr. G. M. Gillett will let your readers have his views on them in due course.

B. S. Anderson.

Tokyo, *January 12th*, 1931.

Birmingham Frequency Change.

I should be greatly obliged if any of your Birmingham readers would give their views on the following.

As is fairly well known in this area, the Frequency Change Department either :—

(*a*) Undertakes to replace all a consumer's 25-cycle plant by 50-cycle plant of equivalent rating and quality, or (*b*) pay a lump sum to the consumer to enable him to do this himself.

In case (*a*) labour is supplied by the Frequency Change Department, but the interference with production and consequent monetary loss are supposed to be so small as not to warrant any reimbursement to the consumer.

In case (*b*) the lump sum covers the cost of labour, and also necessary mechanical modifications to adapt the new machines.

My problem is this :—If I possess £1,500 worth of electrical plant and can now, if I re-organise my works, manage with £1,200 worth, is it not only reasonable for me to expect to be paid for the whole of my existing plant, my 25-cycle plant being unsaleable, because no one will be able to use it on 50 cycles? This case is obviously one for treatment on lump sum lines. I could then turn the money saved to account in my business, and also save the wasteful manufacture of plant I do not want. I understand I cannot do this, as I must not "make a profit" out of the frequency change. The same objection appears to hold if I put in the same amount of horse-power, but of cheaper make.

Am I "making a profit?" Can I be forced to replace £1,500 worth of plant, and by whom?

Freedom.

February 2nd, 1931.

Published Specifications.

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specification will be printed and abridged, and all subsequent proceedings will be taken.

1929.

20,573. "Record-card punching-machine with keyboard and electric control apparatus." L. Mellersh-Jackson (Siemens & Halske Akt.-Ges.). July 4th, 1929. (341,050.)

23,372. "Apparatus for traffic signalling." G. Prescott and H. Murphy. April 28th, 1930. (341,066.)

26,446. "Suspension of electric discharge apparatus." British Thomson-Houston Co., Ltd. August 31st, 1928. (318,261.)

26,658. "Devices for transmitting, electrically, indications, and movements to a distance." W. Barsties. September 2nd, 1929. (341,056.)

27,188. "Electric switching systems for transmitting step-by-step movements." R. M. Hamilton. September 6th. 1929. (341,059.)

27,472. "Glow-discharge tubes for amplifying, detecting, and generation of currents." Dr. G. Seibt and Dr. H. Bley. October 17th, 1928. (341,061.)

27,473. "Glow-discharge tubes for amplifying, detecting, and other purposes." Dr. G. Seibt and Dr. H. Bley. October 29th, 1928. (341,062.)

27,474. "Glow-discharge tubes for amplifying, detecting, and other purposes." Dr. G. Seibt and Dr. H. Bley. November 26th, 1928. (Addition to 341,062.) (341,063.)

27,475. "Glow-discharge tubes for amplifying, detecting, and other purposes." Dr. G. Seibt and Dr. H. Bley. December 5th, 1928. (Addition to 341,062.) (341,064.)

29,371. "Electrical circuit interrupters." Associated Electrical Industries, Ltd. September 27th, 1928. (319,749.)

29,567. "Electric discharge tubes having an electron discharge." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). September 30th, 1929. (340,936.)

21,759. "Apparatus for intermittently operating electric signals." E. Brontman (A. Garbarini). October 1st, 1929. (341,019.)

29,796. "Electrical driving gear." Campbell & Isherwood, Ltd., and S. R. Rothwell. October 2nd, 1929. (340,942.)

29,883. "Bonding devices for use with electric cables." Callender's Cable and Construction Co., Ltd., and P. V. Hunter. October 2nd, 1929. (340,995.)

30,237. "Telegraphic apparatus for secret transmissions." R. Michel and R. Dreyse. October 5th, 1929. (341,073.)

30,421. "Microphones." Associated Telephone & Telegraph Co. October 8th, 1928. (341,006.)

30,422. "Construction of lighting units." L. G. Hawkins & Co., Ltd. (Miller Co.). October 7th, 1929. (341,042.)

30,507. "Protection arrangement for generators, in particular for Ljungstrom combinations." Siemens-Schuckertwerke Akt.-Ges. October 29th, 1928. (341,081.)

30,532. "Thermionic valve systems." J. Robinson. October 8th, 1929. (341,082.)

30,623. "Telephone systems." Standard Telephones & Cables, Ltd., C. B. V. Neilson and H. J. Turton. October 9th, 1929. (341,044.)

30,624. "Telegraphic receivers and retransmitters." Creed & Co., Ltd., F. G. Creed, and R. D. Salmon. October 9th, 1929. (Patent of addition not granted.) (341,064.)

30,625. "Switching arrangements for automatic and semi-automatic telephone systems." Standard Telephones & Cables, Ltd., C. E. Stevens, and J. Schoeneman. October 9th, 1929. (341,045.)

30,627. "Microphones." A. Graham & Co., Ltd., W. Stott, and D. Moody. October 9th, 1929. (341,046.)

30,675. "Telephone instruments." Automatic Telephone Manufacturing Co., Ltd., and S. R. Smith. October 9th, 1929. (341,048.)

30,676. "Apparatus for use in television or like systems." Associated Telephone & Telegraph Co. November 9th, 1928. (341,049.)

30,857. "Galvanising or electroplating processes." Waldberg Soc. Anon. and M. Von Devecis. October 11th, 1929. (341,093.)

30,899. "Continuously-loaded electrical conductors." Electrical Research Products, Inc. June 8th, 1929. (341,095.)

30,936. "Visual signalling devices." Automatic Telephone Manufacturing Co., Ltd., and S. F. Smith. October 11th, 1929. (341,097.)

30,937. "Electrical indicating or display devices." Automatic Telephone Manufacturing Co., Ltd., and W. H. Paulett. October 11th, 1929. (341,098.)

30,939. "Automatic switches for use in telephone or like systems." Automatic Telephone Manufacturing Co., Ltd., and H. Jackson. October 11th, 1929. (341,099.)

30,961. "Electric indicator or signalling device for personal wear." A. T. Beaumont. October 11th, 1929. (341,102.)

31,039. "Electric relays." British Thomson-Houston Co., Ltd. (Compagnie Française pour l'Exploitation des Procédés Thomson-Houston). October 12th, 1929. (341,106.)

31,284. "Electric selective multiple control apparatus for railway points, signals, and the like." Westinghouse Brake & Saxby Signal Co., Ltd. October 20th, 1928. (341,115.)

31,308. "Electrical connections." P. Allenic. November 3rd, 1928. (341,116.)

31,339. "Electric hot-plates and similar heating appliances made of cast metal." J. W. Buckley, C. Sykes, and Associated Electrical Industries, Ltd. October 15th, 1929. (341,121.)

31,438. "Models for the design of illuminating systems." General Electric Co., Ltd., and J. M. Waldram. October 16th, 1929. (341,123.)

31,734. "Transportable dynamo-electric machines." Siemens-Schuckertwerke Akt.-Ges. October 19th, 1928. (341,127.)

31,989. "Electron-discharge tube relays." Gramophone Co., Ltd., and R. B. Morgan. October 21st, 1929. (341,139.)

32,242. "Electric cables." C. J. Beaver and W. T. Glover & Co., Ltd. October 23rd, 1929. (341,144.)

33,661. "Electric motors." D. B. Hoseason and Associated Electrical Industries, Ltd. November 5th, 1929. (341,164.)

33,951. "Luminous electric discharge tubes." General Electric Co., Ltd. June 17th, 1929. (341,169.)

33,976. "Talking-picture apparatus." A. W. Harris. November 7th, 1929. (341,170.)

34,190. "Electric locomotives." Locomotive Booster Co. April 12th, 1929. (341,172.)

34,205. "Electric motor vehicles." Maschinenfabrik Oerlikon. November 9th, 1928. (341,173.)

34,952. "Electrical switchgear." D. R. Davies and Associated Electrical Industries, Ltd. November 15th, 1929. (341,188.)

35,092. "Systems of electric motor control." British Thomson-Houston Co., Ltd. November 16th, 1928. (341,189.)

35,368. "Telephone message apparatus." S. Zullo. November 19th, 1929. (341,194.)

35,416. "Electric signal means for regulating traffic." H. Rabinovitch. November 20th, 1929. (341,196.)

35,579. "Combined electric fire and hot-water radiator." C. J. Turner. November 21st, 1929. (341,197.)

35,646. "Apparatus for measuring radiant energy." British Thomson-Houston Co., Ltd. November 21st, 1928. (341,200.)

35,660. "Electric variable-speed power-transmission systems." H. H. Jeffcott. November 21st, 1929. (341,201.)

36,167. "Electric heating apparatus." H. J. Dean. November 26th, 1929. (341,211.)

36,799. "Electric rail and like vehicles." J. Buchli. December 3rd, 1928. (Addition to 234,006.) (341,219.)

37,170. "Electric relays." International General Electric Co., Inc. December 4th, 1928. (341,221.)

37,681. "Spark plugs." A. C. Spark Plug Co. December 7th, 1928. (341,227.)

38,925. "Railway signalling apparatus." A. G. Kershaw and Westinghouse Brake & Saxby Signal Co., Ltd. December 19th, 1929. (341,239.)

39,525. "Electro-deposition of metals." S. O. Cowper-Coles. December 27th, 1929. (341,246.)

39,751. "Systems of electric motor control." British Thomson-Houston Co., Ltd. December 31st, 1928. (341,250.)

1930.

1,213. "Electric lampholders." H. A. Turner and H. Bloom. January 13th, 1930. (Cognate application 15,105/30.) (341,265.)

1,773. "Electromagnetic vibratory devices, such, for example, as talking-machine pick-ups." Gramophone Co., Ltd., and B. Jackson. January 17th, 1930. (341,268.)

2,534. "Fusible electric cut-out elements." English Electric Co., Ltd., and A. A. Heat. January 24th, 1930. (341,281.)

2,540. "Phase-shifting transformers." D. A. Oliver. January 24th, 1930. (341,282.)

2,645. "Hot-plates heated by electric, gas, or spirit flat irons." D. B. S. Marshall. January 25th, 1930. (341,286.)

3,673. "Means for detecting frequency-modulated energy." Marconi's Wireless Telegraph Co., Ltd. February 1st, 1929. (341,296.)

6,219. "Electrical liquid resistance controllers." English Electric Co., Ltd., and C. T. Scarf. February 25th, 1930. (341,322.)

6,567. "Electric induction furnaces." Electric Furnace Co., Ltd. February 27th, 1929. (341,325.)

7,791. "Devices for mechanically passing leading-in wires through the holes of caps of electric incandescent lamps, discharge tubes, or similar devices." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. March 23rd, 1929. (341,331.)

8,193. "Apparatus for rectifying alternating electric current." Lodge-Cottrell, Ltd. (International Precipitation Co., Inc.). March 13th, 1930. (341,335.)

9,098. "Protective devices for connection with electric supply lines." British Equipment Co., Ltd. March 22nd, 1929. (341,343.)

11,452. "Apparatus for the reception of pictures." British Thomson-Houston Co., Ltd. April 15th, 1929. (341,353.)

13,025. "Electric vacuum switches." International General Electric Co., Inc. April 27th, 1929. (341,364.)

13,485. "Resistance units." British Thomson-Houston Co., Ltd. May 1st, 1929. (341,367.)

21,559. "Trunk line electric cables with screened cores." Siemens-Schuckertwerkt Akt.-Ges. July 27th, 1929. (341,384.)

Trade Mark Applications.

THE following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from January 28th :—

Superska. No. 513,937. Class 6. Electric motors.—N. V. Heemaf Co., Hengelo, Holland. (British representatives : Dicker, Pollak & Mercer, 20-23, Holborn, E.C.1.)

Transrecter. No. 518,618. Class 8. Apparatus for rectifying electric currents.—Siemens Bros. & Co., Ltd., Caxton House, Tothill Street, S.W.1.

Panophase. No. 518,936. All goods in Class 8.—Parlophone Co., Ltd., 1, Broad Street Place, E.C.2.

Corlec. No. 517,139. Class 13. Luminous devices for assisting in the location of electric switches.—"Corlec" Indicators, 1, Oxford Place, Leeds.

Ellinol. No. 517,314. Class 50. Materials composed wholly or principally of synthetic resin for industrial purposes.—Ellison Insulations, Ltd., Perry Barr, Birmingham.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

ABERDEEN.—Housing scheme, Mansfield Road district. Balnagosk; city engineer.
ASHBY-DE-LA-ZOUCH.—Houses (101) for the R.D.C.; surveyor.
AYRSHIRE.—Extensions, Mauchline school, with electrical and heating work, for the county E.C.; William Reid, architect, 14, Wellington Square, Ayr.
BARNSLEY.—Houses (2,212) during the next five years for the T.C.; borouogh surveyor.
BEXHILL-ON-SEA.—Additions, Metropolitan Convalescent Institution, Sea Road; Campbell Jones & Smithers.
BIRMINGHAM.—Bank premises, Pershore Road; T. Elvins, builder, Soho Road. New Civic centre; city engineer.
BLACKPOOL.—Cinema, Westcliffe Drive, for F. Parker; Mercer & Duckworth, architect, Express Chambers, London Street, Fleetwood.
BRADFORD.—Houses, Chellow Grange (£222,202); Henry Boot & Sons, Ltd., Sheffield. New premises for Grammar School (£189,000) for the E.C.
BURY.—Printing works, Dumer's Lane, for Bibby & Baron, Ltd., New Bridge Mills; John Tinline, Ltd., builders, Parker Street.
CROYDON.—Arcade, George Street to North End; Allders, Ltd. Reconstruction, Old Town area; borough engineer.
DARLINGTON.—Houses (50) for the T.C.; borough surveyor.
DONCASTER.—Aerodrome, Cantley; borough engineer.
DOVER.—Bank for the National Provincial Bank, Ltd., London.
ECCLES.—Houses (184) for the T.C.; borough surveyor.
ESSEX.—School at Bocking, Braintree, for the county E.C.; J. Stuart, architect, Springfield Old Court, Chelmsford.
FALKIRK.—Houses (68) for Corporation (£20,400); burgh surveyor.
GARSTANG.—Houses (175) for the R.D.C.; surveyor.
GRAVESEND.—Factory, Denton Court, for Empire Mills (Denton).
HAMPSHIRE.—Senior school (320 places), Andover, for the county E.C.; A. L. Roberts, county architect, Winchester.
HORNCHURCH.—Houses (85), Norfolk Road, for E. G. Bratchell & Son.
HOUGHTON-LE-SPRING.—Houses (150); surveyor to R.D.C.
HUDDERSFIELD.—Cinema theatre and shops, Waterloo, with electrical and heating work; C. F. Mallinson & Son, architects, Market Place.
KENT.—Central schools, Hoo, Meopham, and Cliffe, for the county E.C.; director of education, Maidstone.
LANCASTER.—Houses (800) during the next five years; borough engineer.
LIVERPOOL.—Two senior schools, Dovecot estate, and Lambeth Road; director of education, Education Offices, Sir Thomas Street.
LONDON (BETHNAL GREEN, E.).—Tenements, Hackney Road (£51,800); borough engineer. Reconstruction of Wilmot Road school (£20,810); Charles R. Price.
(BOW, E.).—Elementary school, Back Alley (£16,123); Patman & Fotheringham, Ltd.
(LEYTON, E.).—Extensions, Canterbury Road schools, for the borough E.C.; J. H. Jacques, architect, 61, West Ham Lane, Stratford, E.
(POPLAR, E.).—Reconstruction, Grand Palace Cinema; Cecil Masey, architect.
(HIGHGATE, N.).—Enlargement, Haverstock Central School (£20,000); L.C.C. architect.
(BECKENHAM, S.E.).—School (800 places) for the E.C.; C. E. Staddon, clerk.
(CAMBERWELL, S.E.).—Reconstruction, Scarsdale Road School (£32,000); L.C.C. architect.
(BALHAM, S.W.).—Church, High Road; J. B. Mendham.
(BATTERSEA, S.W.).—Bank for Lloyds Bank, Ltd., St. Johns Road; O. Hill. Shops, Northcote Road; Hillier, Parker, May & Rowden.
(WANDSWORTH, S.W.).—Factory for the Aluminium Plant and Vessel Co., Ltd., at Point Pleasant; Wallis Gilbert and Partners, architects.
(WESTMINSTER, S.W.).—Reconstruction of Buckingham Gate central school (£23,600); L.C.C. architect.
LONDON (*Continued*).
(EDGWARE, W.).—Cinema, Station Road; W. J. King, architect.
(HAMMERSMITH, W.).—Town hall, Brook Green; borough engineer.
(STRAND, W.C.).—Buildings for Law Land Co., Ltd., Wellington Street and Savoy Street; E. & W. Hunt.
LONG EATON.—Houses (98); U.D.C. surveyor.
LOWESTOFT.—Re-erection of Hopton Hall (mansion) for Dr. E. C. Peers.
MACCLESFIELD.—Rebuilding Opera House; A. Clayton, architect, 6, Chestergate.
MELTON MOWBRAY.—Foundry, Holwell Ironworks, for the Stanton Ironworks Co., Ltd.
MIDDLESEX.—Schools, Bromyard Avenue, Acton, and Pinkwell Lane, Hayes, for the county E.C. School, Bacon Lane, Kingsbury (£19,142), for the county E.C.; J. Laing, Sons, Ltd., Mill Hill, N.W.
MORECAMBE.—Library, Queen Street; borough engineer.
NELSON.—Enlargement of Reedyford Hospital; hon. secretary. Senior school, Edge End (£35,265), for the borough E.C.; borough surveyor.
NORWICH.—Cinema, High Street, Downham; I. W. Carnell and W. Dymoke, architects, Paradise Chambers, King's Lynn
NOTTINGHAM.—Houses (528) and flats (36), Valley estate; borough engineer.
ORSETT.—Extensions, Little Thurrock Isolation Hospital, for the Joint Hospital Board; E. Fincham, architect, 4, Orsett Road, Grays.
QUEENSBURY.—R.C. church; C. E. Fox, architect, Dewsbury.
ROCHESTER.—Houses and shops, Allhallows; Allhallows-on-Sea Estates, Ltd.
ST. ALBANS.—Cinema for Louis Morris; Martin Hatfield, architect.
SCARBOROUGH.—Swimming baths (£50,000); borough engineer.
SLOUGH.—Shops and offices, with lighting and heating work, William Street; Charles Bowyer, architect.
SOMERSET.—School, Ansford, for the county E.C.; F. Burkinshaw, secretary, Weston-super-Mare.
STOCKPORT.—Cinema, Mersey Square; W. Thornley, architect, Wigan.
STOKE-ON-TRENT.—Skating rink, Bath Street; Birkett and Grant.
STRATFORD-ON-AVON.—Shops and offices for the T.C.; L. L. Dussault, architect, 39, Newhall Street, Birmingham.
SURREY.—Secondary schools, Wallington and Merton, for the county E.C.; education architect, Kingston-on-Thames.
SWANSCOMBE.—Houses (100) for the U.D.C.; I. E. Croucher, surveyor.
TAUNTON.—Houses (500) during the next five years for the T.C.; borough surveyor.
TORQUAY.—School, Torre, for the borough E.C.; director of education.
TUNBRIDGE WELLS.—Senior boys' school for the borough E.C.; director of education.
TWICKENHAM.—Kneller senior school (£45,300) for the borough E.C.; director of education.
TYNEMOUTH.—Houses (104), Balkwell estate; borough engineer.
WARWICKSHIRE.—Schools, Binley and Wyken, and technical college and school of art, Rugby, for the county E.C.; county architect, Leamington Spa.
WASHINGTON (Co. DURHAM).—Houses (66) for the U.D.C.; surveyor.
WEST BRIDGFORD (NOTTINGHAM). — Cinema, Central Avenue; A. J. Thraves, architect.
WESTON-SUPER-MARE.—Hospital extensions (£20,000) for the U.D.C.; surveyor.
WEST SUSSEX.—School, Horsham, for the county E.C.; H. P. Roberts, county architect, North Street, Chichester.
WINDSOR.—Houses (60) for the T.C.; borough surveyor.
WOLVERHAMPTON.—Extensions, Graisley school (£25,525); H. J. Amies & Sons.
WORCESTERSHIRE.—Senior school, Evesham, for the county E.C.; director of education, Worcester.
YEOVIL.—Houses (100) for the T.C.; borough surveyor.